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TRANSLATIONS FROM
UCHEBNIK DLYA PODGOTOVKI MEDSESTER
(Nurses' Training Manual)
- USSR -

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TRANSLATIONS FROM: NURSES' TRAINING MANUAL

[Following are translations of excerpts from
Uchebnik dlya Podgotovki Medsester (Nurses'
Training Manual) edited by A. G. Safonov,
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Chapter I

Fundamentals of Soviet Public Health Organization

Basic Principles of Soviet Public Health

Soviet public health represents a system of state and public measures for the prevention and treatment of diseases, a provision of hygienic working and living conditions, the creation of conditions for obtaining maximum work fitness and longevity on the part of Soviet people.

Soviet public health is an inseparable part of the Soviet national system. It is being developed along with the growth of the national economy of the Soviet Union, its economy and culture.

The main tasks and principles of Soviet public health have been determined in the CP program, adopted at the Eighth Congress of the RKP (b) [Russian Communist Party (Bolshevik)]: "The RKP (b) bases its activity in the field of safeguarding the public health primarily on the taking of broad health-improvement and sanitary measures aiming at the prevention of the development of disease.

In accordance with this, the RKP (b) poses as its next problem:

1. The decisive realization of broad sanitary measures in the interests of the working class, namely: a) health improvement of populated places (protection of the soil, water and air); b) placement of the public dining room system on scientific-hygienic principles; c) the organization of measures preventing the development and spread of contagious diseases; d) the creation of sanitary legislation.

2. The control of social diseases (tuberculosis, venereal disease, alcoholism and others).

3. Provision of generally available, free and qualified therapeutic and medicinal aid."

These program requirements and principles of the CP have also been made the basis of Soviet public health organization.

In the Constitution of the USSR, the right of every citizen of the USSR to have free medical care, material aid during disease, invalidism and a pension in old age has been affirmed. Soviet mothers are offered the right to material assistance during delivery as well as for bringing up children in children's institutions, and are offered stipends for having many children. In Article 120 of the Constitution, the following has been written: "citizens of the USSR have the right to material security in old age as well as in the event of disease and loss of the ability to work... this right is assured through the extensive development of social insurance for laborers and white-collar workers by the government, free medical aid to workers, and the placement of an extensive system of health resorts at the disposal of the working class."

The CPSU has taken a guiding part in matters of safeguarding the public health at all stages of its history. The founders of Marxism-Leninism, Marx, Engels and Lenin, showed that the problem of safeguarding

and strengthening the health of the people can be fully solved only after overthrowing the regime of the bourgeoisie, under conditions of a dictatorship of the proletariat.

The main Party requirements on matters of safeguarding the labor and health of workers were worked out by V. I. Lenin and adopted in a program approved by the Second Congress of the RSDRP /Russian Social Democratic Workers' Party/ in 1903. After the establishment of the Soviet regime in the Soviet Union under the direction of the CP, the most important state decrees were worked out and promulgated, directed at the improvement of medical care and at safeguarding the health of industrial workers, kolkhoz workers, mothers and children.

On 14 January 1960 the CC CPSU and Council of Ministers USSR adopted a historic decree, "Measures for Further Improvement of Medical Care and Safeguarding the Health of the Population of the USSR", whereby new tasks of Soviet public health were defined during the period of full-scale building of communism in the Soviet Union.

The Twenty-Second Congress of the CP approved the new CPSU Program, a program for building a communistic society in the USSR. In the Program, the basic principles of Soviet public health have found further development: free, mass and generally available care. "The socialist government," it is emphasized in the Program, "is the only one which concerns itself with safeguarding and constantly improving the health of the entire population. This is assured by a system of social-economic and medical measures." (*Kommunist*, 1961, No. 16, P. 74).

The CPSU Program provides that in a communistic society the needs of the population for highly qualified medical care will be entirely satisfied, and that the entire population of the country will be covered by dispensary observation. The extensive building of therapeutic, children's, sanitary-epidemiological institutions, sanatoria and rest homes, consultation offices for women's and children's diseases will assure the accomplishment of these tasks. The prophylactic trend in Soviet medicine remains the leading one. Improvement of working and living conditions of the population, the mass development of physical culture and athletics, provided for by the CPSU Program, represent the basis for the further strengthening of health of Soviet people.

"The Party considers it one of the most important tasks to provide for the upbringing, beginning with the earliest childhood, of a physically strong young generation with the harmonious development of physical and mental powers." (*Kommunist*, 1961, No. 16, P. 74).

The administration of public health in the USSR is concentrated in a very few organs-- the Ministry of Health USSR, the ministries of health of the union republics, and in the local public health organs.

The unity of Soviet public health lies in the fact that at various periods of its development the forms and methods of operation of the medical and sanitary-antiepizemic institutions of various departments have been standardized. Methodological guidance and control of the entire therapeutic-prophylactic activity of the official medical institutions in the country are exercised by the Ministry of Health USSR and the local public health organs. The progress of Soviet public health to

a considerable degree depends on the fact that it is constructed on strictly scientific principles, and the achievements of medical science serve the interests of public health practice and are directed at improvement of the health protection of the working class.

State public health planning makes it possible to assure a uniform distribution of material, of medical cadres, of public health institutions in various regions of the country, to direct its resources to the most important fields of public health or to those lagging at one period or another.

In making up the plan of public health development in the various economic regions of the country, consideration is given to the level of the economy, working and living conditions of the population, geographic and national characteristics of the region as well as the health indices of the population: the population structure, physical development, total and child mortality rates, and the morbidity rate.

A distinguishing feature of Soviet public health, the greatest conquest of the CP and of the workers, is the free and generally available nature of qualified specialized medical care. The Soviet government has offered each worker the right to receive free medical aid from specialists. With this aim in view, in recent years, large-scale measures have been taken for expansion of specialized aid by physicians in the rural regions.

In capitalistic countries, medical care is rendered for payment; hospitals are in the hands of private landowners and bring them great profits. The patient pays for treatment, nursing care, performance of operations, etc. For example, in the United States, a complete examination of a patient in a polyclinic costs \$99.00; every day he spends in the hospital costs from \$25.00 to \$50.00, which considerably exceeds the average daily earnings of the worker.

Prophylaxis-- The Leading Principle of Soviet Public Health

The leading principle of Soviet public health is its prophylactic trend. The prevention and reduction of morbidity by means of a fundamental improvement in the working and living conditions of the Soviet people is the main line of the CP in the field of public health. Public health workers consider the prevention of disease, the complete elimination of a number of diseases, the creation of sanitary-hygienic conditions at work and at home as would prevent the occurrence of disease to be their main task. The prophylactic activity of Soviet public health encompasses the following broad group of measures:

- a) General sanitary measures provided by government legislation concerning the safeguarding of labor and by sanitary legislation (length of the work day and rest period, labor protection in hazardous industries, vacations, housing construction, improvement of inhabited places);
- b) Antiepidemic measures directed at the prevention, reduction and elimination of infectious diseases;
- c) The taking of measures for the reduction and prevention of the

most common non-epidemic diseases which are the cause of death and loss of the ability to work on the part of the population: cancer, tuberculosis, cardiovascular diseases, rheumatic fever and others;

d) Active dispensary observation of the state of health of various populations groups: workers in industrial enterprises, children and adolescents (in nurseries, kindergartens, schools, trade and factory-plant schools, workers in the leading occupations of kolkhozes and sovkhoses).

These measures can be successful only with active participation not only of the sanitary-epidemiological service but also of all therapeutic-prophylactic institutions, trade union and public organizations, industrial enterprises and institutions. Broad prophylactic measures in the Soviet Union are inconceivable without bringing in broad masses of the population for this work. The population participates in improvement and in the planting of greenery in inhabited places, raising the level of sanitary culture in industrial enterprises and in agriculture. Through working class personnel bathhouses, clubs, water supply systems, wells are constructed, and parks and squares are laid out.

At industrial enterprises, in kolkhozes and institutions, thousands of aid stations have been created which exercise control and organize the efforts of the workers for sanitary culture at the enterprises, in the kolkhozes and schools and which give first aid for accidents. A tremendous part in taking the sanitary-health-improvement measures is played by sanitation authorities selected at general meetings of laborers, kolkhoz workers, white-collar workers and students.

The experience of mass participation of the population in health-improvement measures in Tul'skaya Oblast, Orekhovo-Zuyevo of Moskovskaya Oblast, and Borisov of the BSSR has been approved by the CC CPSU and the Council of Ministers USSR and is being actively extended throughout all the cities and regions of the Soviet Union.

In taking health-improvement measures the assistance of trade unions is very valuable. It is accomplished through social insurance councils at enterprises, social insurance delegates and the active members of the trade unions. The Red Cross and Red Crescent societies actively assist the public health organs in taking prophylactic measures and in sanitation-education work among the population.

Of inestimable aid to public health organs and institutions are the permanent commissions of rural, rayon, city and oblast councils of workers' deputies, which are organized from the group of deputies of each convocation of the corresponding council. At their meetings the permanent commissions listen to the most important problems of medical care of the population, and they check the work of therapeutic-prophylactic and children's institutions.

The vigorous upswing of the economy of the Soviet Union, the increase in the material welfare, the improvement of culture of Soviet people and the methodical improvement of medical care have had a favorable influence on the state of health of the population of the USSR.

The average length of life in the USSR is 69 years, which is almost two times greater than the average length of life in Russia prior

to the October Socialist Revolution. The mortality rate of children under the age of one year has been reduced by 7.7 times and there has been a considerable improvement in the state of health of the youth.

Therapeutic-Prophylactic Aid to the Urban Population

Therapeutic-prophylactic aid to the population represents a most important division of medical care of the population. It is accomplished by hospitals, lying-in homes, dispensaries and other therapeutic-prophylactic institutions.

After the Second World War, hospitals were combined with polyclinics and outpatient departments, and lying-in homes combined with consultation offices for women's diseases in the USSR. The combination of hospital therapeutic institutions with outpatient-polyclinic institutions contributed to a considerable improvement in the quality of medical care, because it expanded the possibilities for raising the qualifications of physicians not only in polyclinics and outpatient departments but also in hospitals.

In 1949, the following nomenclature of standard therapeutic-prophylactic institutions in cities and in villages was approved:

1. Hospitals: district, rayon, city, and oblast (krai and republic).
2. The medical unit and the health station at the industrial enterprise.
3. A children's hospital with a children's polyclinic and a pediatric consultation office.
4. A lying-in home with a consultation office for women's diseases.
5. A dispensary with an infirmary.

Aside from hospitals of the general type, which give all types of medical assistance to the population, there may be specialized hospitals: tuberculosis, psychiatric, infectious-disease, traumatological, ophthalmic and others.

Dispensaries can be created in different specialties with consideration of the morbidity rate of the population of one locality or another: oncological, tuberculosis, physical culture under the supervision of a physician, dermatovenereological, goiter-control, trachoma and others.

The main principle of care adopted in Soviet public health is the territorial one. This means that the people were serviced by therapeutic-prophylactic institutions according to their place of residence.

In connection with the vigorous industrial construction, beginning with the 1930's, medical units and health stations at industrial enterprises have been developed considerably; here, the workers are given care according to the place of production principle, that is, according to the place of work. However, this does not deprive the workers of the right to be treated in territorial public health institutions. Workers of industrial enterprises which do not have medical units or health stations receive medical aid in the territorial therapeutic institutions

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first. This principle of care has been given the name of "preferential care of industrial workers."

For purposes of a methodical study of the health of the population, elimination of lack of responsibility in care for patients, the district principle of medical care has been made the basis of work of the outpatient-polyclinic departments of hospitals and dispensaries, of consultation offices for women and children. According to this principle, the territory of a city, serviced by therapeutic institutions, is divided into medical districts. For each territorial medical district, in accordance with an order of the Minister of Health USSR, there must be 4,000 population, including 1200 children. For the purpose of giving care to the population a certain number of internists, pediatricians and obstetrician-gynecologists, and other specialists has been provided on the medical district table of organization.

A city medical district unit is called so, because all physicians who are on the table of organization give service to a definite population group (adult and children) living within the district, and work in contact with and give information to one another.

Medical units have internists in their tables of organization who give service to workers directly in shops and in zones of enterprises and structures. Such a principle of care has been given the name of the "shop" principle. One-two medium-level medical workers assist every district and shop physician. The main method of medical care of the population is the dispensary method. Thereby, the physician makes a methodical study of certain population groups (workers in hazardous occupations, children, adolescents, athletes, students, mechanizers in agriculture) or groups of patients (patients with tuberculosis, neuropsychiatric diseases, malignant tumors, and others).

The dispensary method of medical care makes it possible to detect disease early and organize prophylactic measures for the prevention of disease because of the methodical observation of sick and healthy persons.

Early detection of persons with disease is achieved by means of systematic medical checkups of population groups which are on dispensary care. Medical checkups are made by physicians of the outpatient-polyclinic departments of hospitals and dispensaries, consultation offices for women's diseases at certain time intervals and are either comprehensive (if several specialists participate in the checkup) or purposive (if the aim of the examination is the detection of cases of some definite disease-- cancer, tuberculosis, and others).

The hospital is the main institution which renders therapeutic aid.

Combined Hospital

At the present time, the hospital in the Soviet Union represents the therapeutic institution which gives hospital treatment and outpatient-polyclinic care to patients in all specialties. Prior to 1943, the hospitals and polyclinics of the USSR existed independently; now, they have been combined into a single therapeutic-prophylactic institution.

In some cities, with consideration of local conditions, the

existence of independent polyclinics is permitted as an exception.

Two major components can be distinguished in the structure of the combined hospital-- therapeutic and administrative.

The therapeutic part has a hospital with a receiving room and polyclinic with a record room and physicians' offices. The physicians' offices of the polyclinic also represent constituents of the hospital departments, because the same physicians work in them.

The administrative part of the hospital has an office, bookkeeping section, laundry, disinfection chamber, kitchen, transportation unit and the hospital management.

The Polyclinic Department of the Combined Hospital. Outpatient-polyclinic aid to the population is the most massive type of medical aid. It is enough to say that in the RSFSR more than 480,000,000 visits were registered in the polyclinic departments of the hospital.

The polyclinic department of the hospital is the first therapeutic institution to which the patient comes.

At the present time, in the polyclinic departments of hospitals highly qualified physicians of all specialties work. The departments are equipped with modern medical equipment for diagnostic and therapeutic purposes.

In planning outpatient-polyclinic aid, consideration is given to the number of the population and the radius of operation of a polyclinic, and in determining the tables of organization for physicians and medium-level medical workers of the polyclinic department the population morbidity of the territory serviced and the approved standards for physicians in the various specialties are taken into account. Polyclinic aid is constructed according to the territorial district principle.

In the combined hospital, the work of district physicians is organized according to the so-called "two-unit" system, which consists of the fact that one district physician works for a certain period (up to six months) in the hospital and on home visits; the other works in the hospital and in the polyclinic, afterwards they change their places of work. At the present time, the method of alternation in which district physicians work the whole day in the hospital for a certain period (four-six months) and then a certain period (six months-one year, sometimes more) for the whole day in the medical district or in the polyclinic, has also become common.

Because of this, district physicians have the opportunity to observe their patients methodically in the district, polyclinic and hospital. On meeting, they inform one another of the morbidity rate status in the district and of the necessary measures.

The district physician has the right to make use of the polyclinic equipment for diagnostic and therapeutic needs, and can bring in other polyclinic physicians for consultation during the reception of patients as well as for treatment at home.

Medium-level medical workers are assigned to assist each district physician, internist, pediatrician and obstetrician-gynecologist: these are fieldshers, midwives and nurses, and one-two persons are assigned to each district physician.

The district physician does the therapeutic-diagnostic, anti-epidemic and sanitation-education work among the population in his district.

The polyclinic gives care to those coming in directly and patients sent in by district physicians in all medical specialties: internal medicine, surgery, nervous, pediatric, ophthalmic diseases, diseases of the ear, nose and throat and others. In the polyclinic, there is a waiting room, a dressing room, a registry, offices for reception by physicians and procedures rooms.

The premises for the offices, registry, dressing room and waiting room must be of sufficient area, must be kept clean, and there must be no lines or crowding in them. The work of the register office should be precisely organized, for which purpose there should be an adequate number of registration windows. The registration of patients being received by the physician can be accomplished by appearance at the polyclinic or by telephone; there is also a preliminary record. The preliminary record makes it possible to designate the exact time at which the patient is to be seen by the physician.

A medical record is made out in the polyclinic registry on each patient who comes for the first time-- this is the polyclinic case history, in which subsequently all physicians make notes about the change in the state of health and treatment given.

The medical records are kept in a card-file which is made up according to two principles-- according to the residence (street, block and house number) and alphabetically. This makes it possible to find a patient's record quickly.

The senior nurse of the polyclinic department is responsible for the sanitary conditions of the premises, assures the supply of the department with nonmedical and medical equipment and drugs and organizes the work of the department nurses.

Nurses in the polyclinic are assigned to physicians' offices; on the physicians' orders they carry out the therapeutic procedures, assist the physician in receiving patients, fill out and keep medical records of the office. The medium-level medical workers together with the physician participate in giving medical aid to patients at home.

The district physician gives medical aid at home on the same day. After an examination, he can hospitalize the patient in the hospital or leave him at home. In the latter case, he regularly visits the patient and gives the necessary treatment, that is, organizes the patient's hospitalization at home.

In the case of hospitalization at home, systematic nursing care of the patients, the strict accomplishment of the physician's orders should be assured; the necessary toilet care articles should be provided (hot water bottles, thermometer, bedpan and others). The nurse assigned is responsible for care of the patients and carrying out the orders in the case of hospitalization at home. In recent years, on the initiative of the Red Cross society, organizations of Leningrad, Gor'kiy, Shuya of the Ivanovskaya Oblast and others active Red Cross members who have been given special training take care of the patients at home. They organize the feeding of the patients, and perform the elementary

procedures (thermometry, hot water bottles, ice bags, changing the linen, and others). The entire work of the active members of the Red Cross must be accomplished under the observation of a nurse and of the district physician.

The polyclinic also does planned sanitary-prophylactic work: inoculations, detection and treatment of bacillary carriers, and sanitation-education. An epidemiologist of the sanitary-epidemiological station guides and participates in this work. The actual accomplishment of the sanitary-antiepidemic measures in a district is largely entrusted to a medium-level medical worker, a feldsher or nurse.

The nurse or feldsher gives inoculations, carries out disinfection in an infected focus, detects and records persons in contact with patients who have infectious diseases. In doing sanitary-prophylactic work in a district, the medical workers are supported by public active sanitation workers.

The district physician creates a group of active sanitation workers in the district from the active Red Cross members, pensioners, housewives, and students, and methodically directs its activity. In Shuya of Ivanovskaya Oblast, public district councils have been organized to aid the district physician beginning with 1951, and these render considerable aid to the district physicians in giving nursing care to patients at home, detecting patients with infectious diseases, doing sanitation-education work and improving the city. The public district council consists of active sanitation members, of the district pediatrician, and of nurses. The chairman of it is the district internist.

The polyclinic also is responsible for the work-fitness expertise. According to the law on social insurance, each worker has the right to obtain stipends from social insurance funds during disease. For the purpose of receiving the stipend, the worker must present the certificate of temporary inability to work, given him by his attending physician, at his place of work. Each medical worker must strive to reduce the amount of time lost for sickness, to make suggestions to the directors of industrial enterprises and institutions and trade union organizations on the matter of improving working conditions and safety technique and watch strictly for proper issuance and formulation of the medical certificates.

The infirmary of a combined hospital, in contrast to the polyclinic, treats patients on hospital beds. In the infirmaries there are opportunities for longer, methodical, and more detailed study of the patients and observation of them; therefore, patients with serious and complicated diseases are hospitalized for whom it would be difficult to organize treatment under outpatient-polyclinic conditions.

The infirmary of the combined hospital has a receiving room and several departments. The patients are sent to the infirmary by polyclinics or first-aid stations. All the patients come into the infirmary departments through the hospital receiving.

The receiving department receives patients, gives them sanitary processing, makes out the passport portion of medical documents and sends patients to the appropriate hospital department. Where necessary,

emergency aid is given to incoming patients in the receiving. In the receiving, the physician on duty must examine all patients and decides the infirmary department to which they are sent.

In infectious-disease and lying-in departments of general hospitals, there must be independent receiving departments, to which patients with infectious diseases and women expecting to deliver are sent, by-passing the general receiving department.

All the medical records of incoming patients together with the patients are sent from receiving to the infirmary department.

The main structural subdivision of the hospital is the infirmary department. The infirmary departments are organized according to specialties: internal medical, surgical, ophthalmic, otological, lying-in, infectious-disease, and others. In addition, there are auxiliary departments: x-ray, physiotherapy, pathology, and laboratory. The work of the department is directed by the head of the department; at his disposal are residents, nurses and junior medical personnel. In recent years, a considerable number of hospitals has gone over to two-stage care of hospital patients. In this case, the patient is given his complete care by a physician and nurse. The latter performs all the therapeutic procedures, feeds the patients and gives them nursing care. Several of the junior medical personnel tidy up the department premises and are not permitted to give nursing care to the patients. The work of nurses in the department may be in two or three shifts.

Among the responsibilities of the ward nurse are carrying out all the physicians' orders, giving out medications, giving the patients nursing care, feeding them, checking on the sanitary status of the wards. The nurse is responsible for the proper keeping of drugs, always keeps them locked in special medical cabinets. In order to avoid accidents, the drugs should be kept in three medical cabinets: in cabinet A--toxic drugs; in cabinet B-- drugs with strong effects; in the third cabinet-- all the other drugs.

On the tables of organization of the departments, provision is made for the post of senior department nurse, directly subordinate to whom is the entire medium-level and junior medical personnel of the department. The senior nurse directs the entire work of the nursing care of the patients, is responsible for the sanitary-hygienic status of the department, and the work of the junior and medium-level medical personnel.

The diet in the hospital is a most important therapeutic factor, particularly for a large group of patients with internal medical diseases-- with peptic ulcers, cardiac, renal, hepatic diseases and others.

The therapeutic diet in the hospital is organized and supervised by a dietological physician with the aid of a dietician. The dietician is responsible for the work of a kitchen, for the correct manner of making up the menus and of preparation of the dishes, timely preparation of the food and issuance of it to the patients, observes the proper keeping of food products in the kitchen and is responsible for the strict observance of sanitary-hygienic regulations and requirements in the preparation of food.

The main record in the hospital is the case history. The case history on each patient is kept by the ward resident physician during the entire time that the patient is in the hospital. All information concerning the patient's previous diseases, course of the disease for which the patient was admitted to the hospital, treatment used and outcome of the disease is kept in the case history. Complete clinical examination and the determination of the final diagnosis must be completed in the shortest possible time, during the first three days that the patient is in the hospital as a rule. This makes it possible to begin the proper treatment quickly. All data on laboratory and x-ray examination and the physician's orders are entered in the case history.

Before the patient is discharged, the case history is kept by the ward nurse; after discharge, it is given to the hospital record room. Aside from the case history, other records are kept in the hospital and polyclinic: various registration cards, books, diaries and journals. In these documents sections of the therapeutic-prophylactic work of the hospital and polyclinic are recorded.

For example, a book recording physicians' home visits, a book recording patients who have to be sent to the infirmary, a book recording the issuance of medical certificates and others are kept in the polyclinic; in the infirmary a daily record sheet of patients in the department, the infirmary diary, a book recording admission of patients to the hospital and others.

The data of the initial record make it possible to analyze systematically the activity of the hospital, to eliminate defects and work out activity plans of the hospital for the forthcoming period. On the basis of the data of the initial record, the annual report is made up concerning the activity of the city hospital (form No. 1a), in which all the quantitative and qualitative indices characterizing the therapeutic-prophylactic and diagnostic activity of the hospital with respect to services and departments are included.

Medical Units and Health Stations at the Industrial Enterprises

Workers in industrial enterprises are given care by the general medical network and the so-called "closed" system of medical institutions by medical units, outpatient departments at industrial enterprises and health stations.

The medical units are organized at industrial enterprises of the chemical, metallurgical, mining, coal, oil-producing, machine-construction and other branches of industry if the number of workers engaged at the enterprise exceeds 2,000. At enterprises with a smaller number of workers, physician's and feldsher's health stations are created.

The organization of medical institutions directly at the industrial enterprises makes it possible to bring medical aid to the workers, study their working conditions and arrange more efficient measures for the production and prevention of disease.

Medical units and health stations at the industrial enterprises take measures for reducing and preventing traumatism, abscesses, malaria

etc., for the improvement of safety technique and protection of labor in close contact with the administration of the enterprises and with the factory-plant committees.

The medical unit has a polyclinic, infirmary, shop health stations, night prophylactoria, sanatoria and children's nurseries. The problems of the medical unit are the taking of all the therapeutic-prophylactic measures among workers in the particular enterprise, methodical outpatient and infirmary treatment of patients, organization of antiepidemic measures, dispensary care of certain groups of workers, and sanitation-education work.

Internists of the medical unit observe the shop district principle in their work: in the infirmary, polyclinic and shop. One shop internist position is set up for every 1,000 workers. The shop physician regularly makes checkups of the workers of the assigned shop, studies working conditions and takes measures for the elimination of factors hazardous to health, and observes the sanitary-hygienic condition of shop and work places. The shop physician should give special attention to the elimination of defects and dangers in work which can lead to injuries, occupational intoxications and other accidents. For purposes of planned control of the morbidity rate of industrial workers, the medical unit makes up a comprehensive plan of health-improvement measures annually along with the factory-plant committee, administration and the people of the enterprise as well as the sanitary-epidemiological station.

Organization of Medical Care of the Rural Population

The same principles as in the city have been made the basis of medical care of the rural population in the Soviet Union: free, highly qualified and generally available medical care. The vigorous rise of socialist agriculture advances the problem of making the forms and methods of care of workers in sovkhozes and kolkhozes similar to the forms and methods of care of the urban population as quickly as possible.

During the years after the Second World War, the public health organs did considerable work on the reorganization and consolidation of rural therapeutic institutions with the aim of creating and expanding the qualified specialized medical care in the rural areas.

At the present time, in a rural locality, the following therapeutic-prophylactic institutions are in existence: the rural rayon hospital, the rural district hospital and the feldsher-midwife station (less often, a feldsher or midwife station alone).

The historic resolutions of the Twenty-First Congress of the CPSU and of the December Plenary Meeting of the CC CPSU in 1959 require a fundamental improvement in medical care to the rural population on the part of public health organs.

The main institution which provides the rural population with qualified specialized medical care is the rural rayon hospital.

The Rural Rayon Hospital

The rural rayon hospital has an infirmary, polyclinic, and

sanitary-epidemiological department. Included in the infirmary are departments or wards on all the main specialties-- internal medicine, surgery, pediatrics, obstetrics and gynecology, children's and infectious diseases.

In the polyclinic there are also offices for these main specialties, and in a number of hospitals, where necessary by virtue of the morbidity rate of the population, for the main diseases, dermatovenerological, tuberculosis and others. The rayon hospital has auxiliary diagnostic offices and departments: x-ray, laboratory, dental and physiotherapy offices.

The capacity of the rural rayon hospital varies from 35 to 150 or more beds. By the decree of the CC CPSU and Council of Ministers USSR dated 14 January 1960, "improvement of medical care and safeguarding the health of the population of the USSR" it has been provided that the standard rural rayon hospital should be a hospital with a capacity of 100-150 beds. Increase in the bed capacity of rayon hospitals will make it possible not only to expand the hospitalization of patients in the main specialties but also to organize hospital and to the rural population in other narrow specialties: tuberculosis, otological and ophthalmic diseases, to improve the hospitalization of sick children. The sanitary-epidemiological stations have been combined with rayon hospitals. Supervision of the entire public health work, therapeutic-prophylactic and sanitary-epidemic work, protection of the health of mother and child has been concentrated now in the rural rayon hospital. The chief physician of the rural rayon hospital is simultaneously the chief physician of the rural rayon; the chief physician of the rayon sanitary-epidemiological station is simultaneously the head of the sanitary-epidemiological department of the rayon hospital and the deputy chief physician of the rayon. The abolition of rural rayon public health departments and the combination of sanitary-epidemiological stations with rayon hospitals have been carried out in the majority of rayons of the USSR. Only in some rayons, where the radius of operation is very great (rayons of the Far North, mountain rayons which are difficultly accessible) has there been no combination of hospitals with sanitary-epidemiological stations into a single institution or the abolition of the rural rayon health departments as yet.

Therefore, in the rural rayon hospital all types of specialized therapeutic-prophylactic aid to the rural population and sanitary-prophylactic measures have been combined. Because of this, the rural rayon hospital has become the organizational and administrative center of public health in the rural rayon. The most important function of the rural rayon hospital is organizational-methodological supervision of the entire therapeutic and sanitary-antiepidemic work in the rayon.

The rayon hospital is in charge of the therapeutic work of district hospitals through rayon specialists, who regularly visit the district hospitals and the rural medical districts, see patients in consultation, give specialized aid on the spot in district hospitals. In the rayon hospital measures are taken methodically for improving the qualifications of physicians and medium-level medical workers in the rural

districts. Recently, rayon hospitals have been giving extensive dispensary care to the rural population, chiefly to mechanizers and innovators of agriculture.

The Rural District Hospital

Rural district hospitals have a bed capacity of 10 to 50 or more beds. The large district hospitals have wards or beds for rendering specialized medical aid (internal medical, surgical, tuberculosis, lying-in, infectious-disease), an x-ray clinic, and a clinical-diagnostic laboratory. Outpatient reception is conducted in several specialties.

The rural district hospitals with a small bed capacity (10-20 beds) naturally cannot give the main types of specialized medical aid, because they do not have the necessary equipment or cadres. Therefore, the immediate problem lies in expanding the district hospitals, increasing their bed capacity so that in the next few years each of them have no less than 35 beds. The district hospital is in direct charge of the work of feldsher and feldsher-midwife stations.

The hospital physicians visit the feldsher-midwife stations, receive patients, assist medium-level medical workers in organizing sanitary-prophylactic work.

The feldsher-midwife and feldsher stations work under the direct supervision of the rural district hospital.

Feldsher and Feldsher-Midwife Stations

Feldsher and feldsher-midwife stations are organized at industrial enterprises, in kolkhozes, sovkhozes, RTS (machine and tractor stations) and rural settlements which have from 200 to 1,000 inhabitants. The main task of feldsher and feldsher-midwife stations is that of rendering medical aid to the population before being seen by a physician, taking prophylactic and health-improvement measures.

On the table of organization of the feldsher-midwife station there is a feldsher, midwife and female attendant; on the tables of organization of the feldsher station, a feldsher and a female attendant. At the feldsher-midwife and feldsher stations, a station has been organized for the sale of drugs to the population. The responsibilities of the one in charge of the pharmaceutical station are entrusted to one of the medical workers.

The feldsher-midwife stations do considerable sanitary-antiepidemic and therapeutic work, take charge of pregnant women and children, give preventive inoculations, render emergency aid in the cases of accidents, and do sanitation-education work among the population. At many feldsher-midwife stations, there are two-three lying-in beds; many kolkhozes have their own lying-in homes. Medical care at these institutions is also rendered by medium-level medical workers. Medium-level medical workers do therapeutic-prophylactic and sanitation-education work in schools, at field camps, dairy farms and RTS.

Safeguarding the Health of Mother and Child

Safeguarding the health of children is the most important concern of the CP and Soviet government. The constitution of the USSR protects the interests of mothers.

In the Soviet Union, there is a broad network of lying-in homes, consultation offices for women's and children's diseases, kindergartens and nurseries. The government provides unmarried mothers and mothers with many children with special stipends. The pregnant woman is given a paid vacation before and after delivery lasting a total of 112 days.

A particularly striking expression of the concern for mother and child has been shown by the ukaze of the Presidium of the Supreme Council USSR dated 8 July 1944, "on increasing state aid to pregnant women, unmarried mothers and mothers with many children, increasing the protection for mother and child, on establishing an honorary title, 'heroine mother' and instituting the 'Maternal Glory' order and 'Medal of Motherhood'". According to this ukaze, promulgated during the years of the Second World War, the government allotted considerable funds for rendering material aid to mothers, expansion of the system of obstetrical institutions, nurseries and kindergartens, and other measures for safeguarding the health of mother and child.

Medical institutions responsible for safeguarding the health of mother and child are the following: the lying-in home with a consultation office for women's diseases, the children's hospital with a children's polyclinic and a pediatric consultation office and children's nurseries.

Lying-in Home

The lying-in home has the following main structural units: the consultation office for women's diseases, an infirmary, therapeutic-diagnostic clinics and an administrative section. Not uncommonly, a gynecological department is included in the lying-in home also.

The consultation office for women's diseases is an institution of the dispensary type, because it makes active observation of the woman during all of her pregnancy as well as in the postpartum period. Dispensary observation of the pregnant woman in the antepartum period makes it possible to study her state of health, to detect diseases which would aggravate the condition of pregnancy, organize treatment for women in whom various diseases have been found.

Consultation offices for women's diseases do systematic work on teaching women the hygiene of pregnancy and rules for taking care of suckling children. At the consultation offices, motherhood schools have been organized, in which the mothers receive training according to a special program. The consultation offices for women's diseases, as well as the polyclinics, work according to the territorial-district principle. A midwife patron, who systematically observes pregnant women, studies their work and domestic conditions and teaches them good sanitary-

hygienic habits, and brings them in for examination to the consultation office for women's diseases, works along with every district physician. Consultation offices for women's diseases have several clinics: obstetrical, gynecological, venereological, dental, procedures and others. In the consultation offices, social-legal clinics operate which are interested in safeguarding the rights of pregnant women.

The most important task of the consultation office for women's diseases is that of making sure the women come to the consultation office in the early periods of pregnancy (before two-three months) in order to organize methodical observation of the health of the pregnant woman and give the necessary therapeutic aid in case of disease or pathological conditions during the course of pregnancy.

The infirmary of the lying-in home (or the lying-in department of a general hospital) is designed for rendering infirmary assistance to pregnant women.

Obstetrical assistance under infirmary conditions is a most important condition for reducing the maternal mortality rate during delivery, preventing traumatism during delivery and various postpartum complications.

In the cities, now all pregnant women are assured hospital obstetrical assistance; in the rural locality, part of the deliveries are still occurring at home. The lag in hospital obstetrical assistance in the rural areas is explained primarily by the inadequate sanitation-education work among women on the part of physicians and medium-level medical workers.

The lying-in home or lying-in department of the general hospital has two departments: clean and doubtful (isolation). Each of them consists of the following structural parts: a receiving-inspection department, a delivery unit, a postpartum unit and a ward for the newborn.

The woman who is going to deliver is admitted first to the receiving-inspection unit, where she is carefully examined by the physician on duty, and subjected to sanitary processing. The physician determines the department to which the woman should be sent.

Women who have elevated temperatures from undetermined infections, patients with influenza, angina and other infectious diseases are sent to the isolation department. Such organization of reception and care of women who are ready to deliver makes it possible to protect both the women and newborn children in the lying-in home against various infectious diseases.

Children's Combined Hospital

The children's combined hospital gives all types of medical assistance to children from birth to the age of 14. The polyclinic department takes care of children according to the territorial-district principle within the system of the city medical district unit.

Each district physician has about 1,200 children in his area. He gives care to children of all ages (according to the "single pediatrician" system) in his district.

The combined children's hospital has the following structural parts: infirmary, children's polyclinic and consultation office for children's diseases, and an administrative part.

Children from birth to the age of three are taken care of by the consultation office for children's diseases, while children over the age of three and school children of all ages are under the care of the children's polyclinic.

District pediatricians, like physicians in the general polyclinics, work in the infirmary, polyclinic and in the district either according to a two-unit system or according to an alternating system.

Children's Nurseries

Children's nurseries are institutions which are responsible for the public upbringing of the children to the age of three. When they become older, the children are transferred to kindergartens.

The nurseries make it possible for mothers to participate in useful public work. The nurseries can be single-shift or all day long; there are also nurseries with prolonged days and sanitary nurseries for weekend children.

In the nurseries, the children are divided according to age groups: breast-age children up to the age of nine months; crawling children from the age of 10 months to one year and two months; and two groups of older children: from the age of one year and two months to two years and from two to three years. In each group of 25 children, a nurse-governess gives the care.

For the purpose of protection against importation of infection into the nursery, there is a filter (inspection room), in which the children are examined by a nurse at the time of admission. In addition, every month a pediatrician makes a careful checkup of the children.

A developmental history is kept for every child being reared in the nurseries, and in it all the data concerning the child's physical development, changes in height, weight, illnesses, inoculations and treatment are recorded. In the event of disease, depending on its nature, the child is sent to a hospital, to a quarantine group in the nurseries, or home temporarily.

In the evaluation of the quality of work of nurseries, primarily data concerning the physical development and state of health of the children are taken into consideration.

Sanitary-Antiepidemic Institutions

The prophylactic trend of Soviet public health implies primarily an active influence in improving environmental conditions: health improvement of labor and domestic conditions, organization of a proper diet for the population, the incorporation of sanitary culture into the time and life of the workers. The organization of broad antiepidemic measures in the Soviet Union makes it possible to consider the task not only of reducing the morbidity rate from infectious diseases but also

task of eliminating many of them in the next few years a practical one.

The problems of sanitary welfare, sanitary-hygienic standards of work, of the public dining room system for the population, of safeguarding the natural resources of the country and preventing epidemic diseases have been provided for in sanitation legislation in the form of compulsory standards and requirements. Checking on the accomplishment of these standards and requirements by all organizations, departments and persons on the territory of the USSR is among the duties of the sanitary-antiepidemic service.

The sanitary-antiepidemic service makes a preventive sanitary inspection in the case of planning and designing, construction, reconstruction of industrial enterprises, municipal buildings, dwellings, therapeutic and children's institutions, in the planning and building of cities and rural settlements, sovkhoses and RTS, checks on the observance of sanitary standards in the production of new industrial articles and food products.

The sanitary-antiepidemic service is responsible for concurrent sanitary inspection of the observance of sanitary standards and requirements at operating enterprises, in institutions, schools, in the public dining room system, in dwellings and municipal buildings.

The most important problem of the sanitary-antiepidemic service is the organization and realization of measures for the prevention and reduction of the morbidity rate of infectious diseases among the population.

Sanitary-Epidemiological Station

The main institution of the sanitary-antiepidemic service is the sanitary-epidemiological station. Sanitary-epidemiological stations, depending upon the territory serviced, can be republic, kray, oblast, city or rayon. In the majority of union republics the rural rayon sanitary-epidemiological stations are combined with the rural rayon hospitals and have the rights of sanitary-epidemiological departments headed by the chief sanitation physician of the rayon-- the deputy chief physician of the rayon.

The sanitary-epidemiological stations have three structural parts: the sanitary-antiepidemic department, the sanitary-bacteriological laboratory and the disinfection department. In some city, oblast, kray and republic sanitary-epidemiological stations there are also rabies-control and measles-control laboratories.

The sanitary-antiepidemic department of the sanitary-epidemiological station has two divisions: sanitary and antiepidemic. Included in the sanitary department are specialists on community-housing, industrial, food and school-hygiene.

The sanitary-bacteriological laboratory has the following departments: community, food, and bacteriological.

The sanitary-epidemiological stations direct all the sanitary-antiepidemic work in the kray, oblast or city. However, the practical sanitary-antiepidemic work is done by the following therapeutic-

prophylactic institutions along with the sanitary-epidemiological stations: general and children's hospitals, consultation offices for children's and women's diseases, and dispensaries.

The district physicians-- the internist and pediatrician-- have considerable responsibilities in the matter of taking sanitary-antiepidemic measures. The district physician detects the patient with the infectious disease, takes measures for prompt hospitalization of the patient, epidemiological examination of the focus and makes a record of possible contacts with the patient. Along with the sanitary-epidemiological station, the district physician carries out concurrent and terminal disinfection in the focus. He makes a systematic study of the sanitary status and infectious disease morbidity rate in the district, and does sanitation-education work among the population.

The sanitary-epidemiological station exercises methodical supervision, assists hospitals, children's institutions and dispensaries in antiepidemic work and checks on the observance of the sanitary-epidemiological routine in them.

The industrial-sanitation physician of the sanitary-epidemiological station is closely connected with the medical units and health stations of the industrial enterprises.

Important and varied sanitary-antiepidemic work is also done by the rural district hospitals and the feldsher-midwife stations.

The sanitary-epidemiological station does all of its work according to a comprehensive plan. This plan is made up by the sanitary-epidemiological station according to the main divisions of its activity, with coordination of the plan not only with all departments within the sanitary-epidemiological station but also with other therapeutic-prophylactic institutions, municipal, agricultural, public education and cultural institutions. The plan obliges the various offices to take sanitary measures in the institutions subordinate to them.

The sanitary-epidemiological station exercises strict control of the observance of sanitary standards and regulations at all enterprises and institutions, has the right to stop the activity of various enterprises and to fine the directors of the enterprises who have violated the sanitary standards and regulations and who have not taken measures to eliminate these violations.

Under the supervision and with the direct participation of the sanitary-epidemiological station, all the therapeutic-prophylactic institutions engage in spreading medical knowledge among the population, train a group of active sanitation members among the population, and popularize the achievements of Soviet medical science.

Sanitation-education work is also done by houses of sanitation education.

Structure of Public Health Organs

According to the constitution of the USSR, the Ministry of Health USSR is a union-republic ministry. This means that aside from the all-union ministry there are also ministries of health in all the union and

autonomous republics. The Ministry of Health USSR supervises the public health work in the country through the ministries of health of the union republics.

Directly subordinate to the Ministry of Health USSR are some of the largest scientific research institutes, therapeutic institutions, and a medical publishing house. Part of the Ministry of Health is the Academy of Medical Sciences USSR. The Ministry of Health plans the development of enterprises of the medical industry which are in the domain of the *sovmarkhozes* (councils of the national economy), works out the perspective plans for development of the system of therapeutic, children's and sanitary-antilepidemic institutions, the training of physicians and medium-level medical cadres. In the union and autonomous republics the ministries of health of the union and autonomous republics exercise supervision of public health; in the krais and oblasts, the kray and oblast health department; in the cities, the city health department; in the rayons, the rayon health department, which are included in the corresponding local and councils of workers' deputies.

The oblast and kray public health departments are departments of the oblast and kray councils of workers' deputies and are subordinate both to the corresponding council of workers' deputies and to the ministry of health of the union republic.

The city and rayon public health departments are subordinate to the corresponding city (or rayon) council of workers' deputies and the kray (or oblast) council of workers' deputies. The oblast, kray, city and rayon health departments directly supervise the medical institutions ~~under them, and direct public health work over their own administrative territory.~~ In the rural rayons, where the rayon health departments have been abolished, public health is supervised by the rural rayon hospitals headed by a chief physician, who is simultaneously the chief physician of the rayon.

A certain portion of the medical institutions is in the domain of other ministries and offices: the Ministry of Railways, the VTSRS (All-Union Central Council of Trade-Unions) and others.

The ministry of health exercises methodological supervision over those institutions; they are directly controlled by the corresponding offices.

Drugs, instruments and equipment are produced by enterprises of the medical industry which are under the direct supervision of the *sovmarkhozes*. The sale of drugs and medical equipment to medical institutions and to the population is accomplished through pharmacies, pharmaceutical stores and stands.

Pharmaceutical work is supervised by pharmaceutical administrations subordinate to the ministries of health of the union and autonomous republics, the kray and oblast public health departments.

The public health budget for the USSR is part of the national budget and is made up of assignments for public health in accordance with the all-union, republic and local budgets.

Chapter X

Protection of the Population Against Agents of Mass Destruction

Characteristics of Weapons of Mass Destruction

During the years which have elapsed after the Second World War 1941-1945, much attention in imperialistic countries has been given to a search for and development of agents of mass destruction. Among these are atomic (nuclear), chemical and bacteriological weapons.

A characteristic feature of agents of mass destruction, in contrast to ordinary weapons, is the possibility of extensive application of them with the aim of mass destruction of people and material in cities and other inhabited places over considerable territory of the enemy.

These weapons may be used chiefly in an attack from the air by means of aircraft or pilotless craft, among which are pilotless missiles and ballistic rockets.

The tremendous speed and range of rocket flights (some of them have been given the name of "intercontinental" rockets because of their flight range) make the matter of combating them through the agencies of air and rocket defense very difficult, and make it possible to inflict sudden blows against objects located in any part of the territory of a country being attacked. Therefore, with modern weapons the danger of occurrence of atomic, chemical and bacteriological acts of destruction in any part of the country is a very real one.

Atomic Weapons

Atomic weapons were first used by the United States against the Japanese cities of Hiroshima and Nagasaki in August of 1945. Explosive weapons the basis of which is constituted by substances capable of nuclear transmutations are called atomic or nuclear weapons. Fundamentally, these weapons may be used in the form of atomic (nuclear) bombs or artillery shells, as well as appropriate rocket heads with atomic or thermo-nuclear charges.

For the atomic charges, heavy radioactive elements uranium-235, uranium-233 and plutonium-239 are used, in which under certain conditions a chain nuclear fission reaction of the atoms of these elements occurs, forming the energy of the explosion and its damaging effects.

For the hydrogen bomb charges a mixture of heavy hydrogen isotopes is used (deuterium and tritium), or lithium hydride is used (compound of lithium with deuterium).

As an igniter in the hydrogen charge an atom bomb charge is used the explosion of which creates a very high temperature of a few score million degrees, whereby a reaction of helium synthesis occurs, as a result of which the energy of the explosion is produced which considerably exceeds the explosive power of atomic bombs.

The power (caliber) of an atomic (nuclear) charge is characterized arbitrarily by its TNT (trinitrotoluene) equivalent; TNT is one of the main ordinary explosives. By "TNT equivalent", the entire charge of TNT, from the explosion of which a quantity of energy is liberated equal to the energy of the blast of a given atomic or thermonuclear charge, is meant. The TNT equivalent of atom bombs dropped on the cities of Hiroshima and Nagasaki in 1945 amounted to 20,000 tons of TNT. The hydrogen-(thermonuclear) charge tested by Americans in 1954 had an equivalent equal to 15,000,000 tons of TNT. An atom bomb which has a TNT equivalent of 20,000 tons of TNT is customarily called "nominal". According to data published in the foreign press, at the present time in the American army there are atomic charges with a power of several thousands to several hundreds of thousands of tons of TNT equivalent and thermonuclear charges from 1,000,000 to 15,000,000-20,000,000 tons of TNT equivalent.

An explosion of an atomic or thermonuclear bomb can occur in the air, at the surface of the ground, under the ground, over or under the water. In accordance with this, the following are distinguished: air, ground, underground, overwater and underwater explosions of these bombs.

The injurious factors of the atomic (nuclear) explosive weapons are: the shock (explosive) wave, luminous radiation, which possesses also a heat effect, radioactive emanation as well as contamination of the locality with radioactive substances.

The shock wave from the explosion of an atomic bomb with a TNT equivalent of 20,000 tons is a current of strongly compressed air moving at great speed. The shock wave destroys buildings and various structures in its path. It can inflict injury also directly on a person if the person stands in an open place. Most often, people sustain injuries from pieces of falling buildings and splinters of glass. With increase in the distance from the place of the explosion, the strength and the rate of propagation of the shock wave decrease. The shock wave traverses a distance of two kilometers from the site of the blast in five seconds; of three kilometers, in eight seconds. The terrain, direction and force of the wind have an influence on the propagation of the shock wave. The greatest destruction from the atomic bomb explosion of this caliber occurs within a radius of 800 meters (the zone of complete destruction); then, the degree of destruction decreases, and at distances above three-four kilometers (depending on the caliber of the atomic bomb) it is only a problem of glass coming from the windows of buildings. In the case of an explosion of atomic bombs of greater caliber and particularly large thermonuclear bombs, the radius of complete destruction can reach several kilometers. Buildings made of reinforced concrete are more resistant to the shock wave. The nature of the explosion also has an influence on the radius to which the shock waves spread and on the area of destruction which occurs. The radius of spread and the area of destruction are greatest after an air blast of an atomic bomb.

If at the time of explosion of the atomic bomb people are not in shelters but rather in an open place (on the street) they should, in

order to reduce the danger of injury after seeing the flash of light, immediately lie down on the ground prone with their feet toward the place of the flash (the explosion). If it is possible, it is even better to lie in some depression of the surface of the ground. If a person is inside when the atomic bomb explosion occurs, in order to avoid injury from splinters of glass, one should, after seeing the flash, stand in the space between the windows against the wall or lie on the floor under the windowsill or, even better, under the table. Thereby, the splinters of glass which fly out of the window with force do not cause injury.

The luminous radiation from the atomic bomb explosion is many times greater than the brightness of the sun's rays even on a clear day. The fireball created is the source of it. The luminous radiation lasts about two-three seconds.

The luminous radiation possesses a blinding and a thermal effect. If at the time of an explosion a person does not close his eyes or does not cover them with the palms of his hands, at a distance of several kilometers from the explosion of a "nominal" bomb and even tens of kilometers from the site of explosion of a high-powered thermonuclear bomb blindness can occur (at greater distances a very transitory blindness occurs).

The thermal radiation represents a great hazard. Inflammable materials, wood, wood structures take fire or are charred from the thermal effect of the luminous radiation within a radius of several kilometers (after the explosion of high-powered thermonuclear bomb, within a radius of 16 kilometers or more). Burns of different degrees of severity can occur in a person at a distance of up to two-three kilometers from the explosion site (in a case of explosion of high-powered thermonuclear bombs, up to 30 kilometers or more). They are not much different in their character from ordinary burns. A characteristic feature of them is the fact that they occur only on the side of the body facing the place of the explosion. Any object which is between the luminous radiation and the person protects him against burns. Persons who are in shelters or even under the simplest cover are entirely protected against the luminous radiation.

Ionizing radiation occurring from the explosion of an atomic bomb basically consists of gamma-rays and a neutron flux. After the explosion of a "nominal" atom bomb, this constitutes a danger within a radius of 1.5 kilometers, and in the case of the more powerful atom and even thermonuclear bombs, no more than two-three kilometers, producing acute radiation sickness in people.

This ionizing radiation is called "penetrating" by virtue of its capacity of penetrating through various objects. A layer of earth one meter in thickness or a layer of concrete 60 centimeters in thickness weakens its effect by a 100 times. This is why shelters are protection against penetrating radiation.

In the case of an atomic bomb explosion, the dust cloud formed acquires radioactive properties under the influence of neutrons (induced radioactivity) as well as on account of radioactive "debris" of the

nuclear "fuel." By falling out of the cloud onto the ground, the solid radioactive particles cause radioactive contamination of a locality. Particularly considerable contamination of a locality is caused by ground or underground atomic bomb (or thermonuclear bomb) explosion.

Recently, a new type of thermonuclear bomb has appeared which has an outer casing made of cheap natural uranium-238. Such thermonuclear bombs not only have an increased explosive power because of the nuclear decay of the uranium casing under the influence of the neutron flux but are also very dangerous with respect to radioactive contamination of a locality in the wake of the radioactive cloud over a distance of many hundreds of kilometers in the direction of the prevailing winds. The radiation level on the contaminated locality rapidly decreases because of the decay of short-lived radioactive isotopes and is mainly hazardous during the first and, to a lesser degree, the second day after fallout of radioactive substances. Then, over a considerable part of the contaminated territory, radioactive contamination decreases to levels which are not dangerous.

Contact of radioactive substances (dust) with the skin, particularly their entrance into the body in inhaled air or food and water, represents a great hazard for man. Therefore, if one is in a region of radioactive contamination of the locality, he should make use of individual and group protective facilities and should not sit down on the ground, should not contaminate his clothing or body with the earth, should not drink water, should not smoke, should not take food and others.

Chemical Weapons

Among weapons of mass destruction are chemical weapons. Chemical weapons are chemical agents and means of using them which are utilized for combat purposes. Among them are chiefly war gases, which may be used by means of aircraft or rockets for the purpose of injuring people or animals by means of destroying them or producing a prolonged or temporary disorder of health and normal activity.

War gases were first used in the War of 1914-1918. At the present time, aggressive cliques of a number of imperialistic governments are giving great attention to the development of chemical weapons. Current technical facilities for delivering it make it possible for an enemy to use it essentially everywhere and to create foci of contaminated territory of considerable area (up to 100 square kilometers).

Considerable attention is being given also to the development of new types of war gases, effective from a military viewpoint, which possess great toxicity, which exceeds the toxicity of hydrocyanic acid--the strongest of the toxins previously known-- in rapid development of the injury, possibility of penetration and effect on the organism not only through the respiratory organs but also through the human skin, which makes it difficult to protect against them. Among these war gases, specifically, are substances of the group of organic phosphorus agents or the so-called neuroparalytic war gases. Among the representatives of this group of war gases are substances which have been given the name of

"tabun," "sarin," and "soman." Recently, considerable attention has been given abroad to war gases which possess a pronounced psychogenic effect which produce deep-seated disorders in the human mind making him incapable of fighting and working.

Bacteriological Weapons

Among agents of mass destruction are also bacteriological weapons. Aggressive cliques abroad are also giving very great attention to this weapon of mass destruction. In the opinion of foreign military specialists, this type of weapon can be used for spreading severe mass infectious diseases among people and agricultural animals as well as for the destruction of plants which are of industrial and agricultural importance (for example, cereal crops, flax, cotton and others).

Epidemics which can break out in the rear as the result of application of bacteriological weapons can interfere with the mobilization and deployment of the armed forces and interfere with the normal operation of industrial enterprises and other national economic installations.

The basis of the injurious effect of bacteriological weapons is constituted by artificially spread bacterial agents, among which are pathogenic microbes (bacteria, viruses, rickettsias and fungi), which are the pathogens of infectious diseases, as well as by the toxins which they produce (toxic substances).

The choice of one pathogen or another by an enemy depends on its properties, which affect the possibility of its utilization in combat. Among these properties, in the opinion of foreign specialists, are: the capacity of the given pathogen for spread rapidly and by various routes among people and animals, causing epidemics and epizootics; the severity and duration of the disease; the degree of difficulty with which the pathogen is grown (produced), kept and applied.

According to data published in the foreign press, the enemy can use any one of the following as a bacterial weapon: pathogens of bacterial infection: plague, cholera, anthrax, tularemia, glanders, melioidosis, brucellosis and others; pathogens of rickettsial diseases: epidemic typhus, Q fever, Rocky Mountain spotted fever and others; the pathogens of virus infections: natural smallpox, yellow fever, seasonal encephalitides and equine encephalomyelitis, psittacosis and others; the pathogens of fungus diseases: coccidiomycosis, histoplasmosis and others; toxins: botulinus and tetanus.

Bacterial agents can be used by different methods. According to the data in the foreign literature, the most probable method of application of them will be contamination of the air by means of dry and liquid compositions of pathogenic microbes and toxins. When they are sprayed by means of aircraft or rockets, the finely divided solid or liquid particles in the composition are mixed with air and form a cloud of bacterial aerosols, in which these particles are in a suspended state. The bacterial cloud, moving with the wind, can affect people and animals over a considerable territory. People and animals will be infected through inhaling the contaminated air as well as because of infection of the skin

surface. Bacterial particles, settling onto the soil and buildings from the air, create infected localities, including natural water bodies (rivers and lakes). Thereby, unprotected food products, fodder and forage for animals, clothing and various articles can be infected. Among the main facilities for artificial spread of epidemics, according to the data of foreign authors, may be the application of bacterial agents by means of infected ticks, insects and animals.

For the purpose of using infected insects, ticks and small animals (rodents) various types of containers, bags, cans and others can be dropped from airplanes. For these purposes, balloons can also be used (automatic aerostats).

The application of bacterial agents is also possible by means of contamination of water sources (rivers, wells) with utilization of diversionaries for these purposes.

Protection of the Population Against Weapons of Mass Destruction

Despite the tremendous injurious power of atomic, chemical and bacteriological weapons, protection of the population is not only possible but can also be quite effective.

As is well known, one of the main problems of civil defense is protection of the population against weapons of mass destruction. By protection of the population against various agencies of mass destruction is meant special measures and the utilization of technical facilities which contribute to protection of the population, lessening the injurious effect of atomic, chemical and bacteriological weapons on people.

Protection of the population against weapons of mass destruction is accomplished by various civil defense services under the common supervision of corresponding civil defense staffs.

Among the measures which provide protection for the population against agents of mass destruction are measures such as mass training of the entire population beforehand for proper behaviour according to civil defense signals-- "danger of radioactive contamination," "air alarm," and "chemical attack," as well as directly at the time of explosion of the atomic or hydrogen bomb, at the time of application of a chemical or bacteriological weapon and in the elimination of the consequences of the attack.

Among these measures are those taken by civil defense services and by the actual population for the protection of food, water sources, forage and others against contamination by war gases, radioactive agents or bacterial agents.

In this group are also special measures for considerable attenuation of weapons of mass destruction which have already been used. After the use of war gases, this measure will be degassing, that is, the taking of such special measures which either remove the war gases from the surface of various contaminated articles or neutralize them.

After the use of radioactive agents, this will be deactivation, that is, the removal of radioactive agents from various surfaces (the body, clothing and others).

After the use of bacterial weapons, this will be disinfection; insect elimination, that is, insect destruction, and deratization, that is, rodent elimination.

All these measures are very effective in many cases. Aside from this, protection of the population is also carried out by means of special technical facilities. Among these are individual and group protective facilities for the population.

The individual measures are designed for the protection of every person individually. Among these measures are gas masks, protective clothing and various so-called handy measures. The group facilities or, in other words, group protection facilities, are designed for simultaneous protection of a group of people. Among these are specially constructed shelters as well as various kinds of very simple cover.

A characteristic feature of the individual and group protective facilities, in the majority of cases, is their universality, because, first of all, the enemy can use any type of weapon of mass destruction as well as several types in various combinations, and, secondly, it might be necessary to have and use several types of protective facilities simultaneously, which would complicate and make much costlier their utilization. This, however, does not mean that all measures and technical protective facilities are equally effective against all types of weapons of mass destruction.

The gas mask, while protecting against war gases and radioactive agents as well as bacterial agents, does not protect against the shock wave from an atomic explosion.

Special shelters afford effective protection against all types of weapons of mass destruction depending on their construction (what class they belong to) and where they are located with respect to the epicenter of the atomic or hydrogen bomb explosion.

Speaking about technical protective facilities against weapons of mass destruction, it should be emphasized that their protective effect depends to a considerable degree on their proper utilization, that is, application and maintenance. Thus, for example, a modern gas mask is quite effective against war gases only if it is put on correctly and quickly, and if it is in good order.

According to the principle of their protective action, individual and group protective facilities can be isolating or filtering.

Isolating protective facilities completely isolate a person from the contaminated air and contaminated objects; filtering facilities decontaminate the contaminated air by means of filtering it.

Based on what has been stated, gas masks, and skin protection facilities which are both isolating and filtering are distinguished, and these terms are also applied to shelters which can be either sealed off or supplied with ventilation filters.

Individual Protective Facilities

Among these are protective facilities for the respiratory organs-- gas masks-- and for the skin. According to the principle of their

protective action, gas masks, as has already been mentioned, are divided into isolating and filtering types. The oxygen isolating gas mask (KIP) completely isolates the human respiratory organs from contaminated air. Breathing occurs from a supply of oxygen which is in the compressed state within the tank of the gas mask itself as well as through the regeneration of exhaled air by means of chemical absorption of excess carbon dioxide and water vapor in a special cartridge. The current model of the gas mask of this type is the KIP-5 (Fig. 168); if the oxygen tank is changed it can be used for a maximum period of two hours. As the result of the limited service period of these gas masks and their inconveniences in wearing, they are designed chiefly for various persons and active units within the civil defense system.

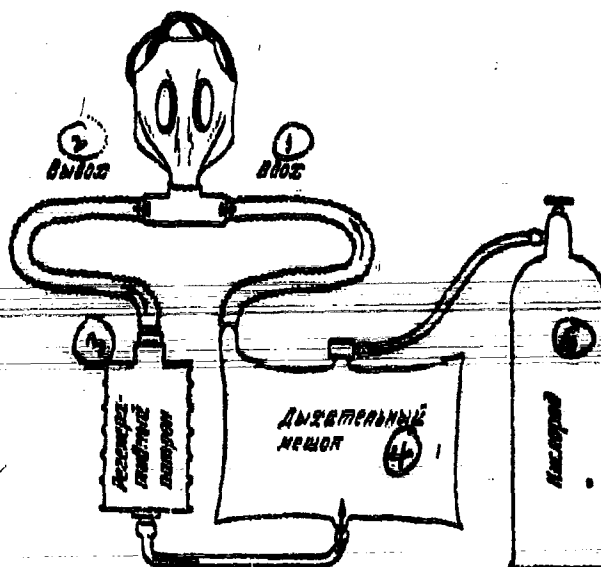


Fig. 168. Diagram of Breathing in an Isolating Gas Mask. 1. inspiration; 2. expiration; 3. regenerator; 4. breathing bag; 5. oxygen.

The main type of gas mask used for the population and mass active units of medical and other services of civil defense are filtering gas masks. One of these is the modern gas mask for the civilian population (civilian gas mask, improved), which is designed for protection of the respiratory organs, face and eyes against the injurious effect of war gases in the form of gases, vapors, fogs or poison smokes, radioactive substances and bacterial agents if they are present in the surrounding air.

The gas mask consists of a canister, a face portion and a bag (Fig. 169). Purification (filtration) of the inhaled air with respect to war

gases and radioactive substances as well as poison smokes takes place in the canister. For this purpose, there are special absorbents and a smoke filter. For reinforcement the body of the canister has the so-called transverse ridges on the outside; on the bottom of the canister is an opening for the intake of air to be inhaled. On the canister cover there is an elbow nozzle with a screw surface for connection with the face portion of the gas mask. The face portion of the gas mask consists of a rubber mask with goggles and a system of straps and head pads for attachment of it to the head, a valve box and connecting hose. The currents of inhaled and exhaled air are divided in the valve box. In it, there are one inlet and two outlet valves. The inlet valve opens during inspiration and closes during expiration. The outlet valves open during expiration and close in inspiration, preventing the contaminated air from coming under the mask.

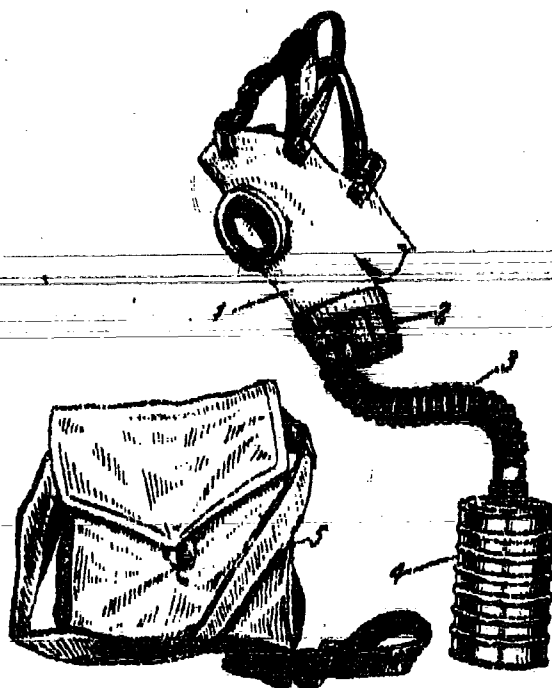


Fig. 169. Gas Mask for Civilian Population. 1. mask; 2. valve; 3. corrugated connecting hose; 4. canister; 5. bag for carrying gas mask.

Considering the appearance of new highly toxic war gases, a second, lower outlet valve has been added to the modern gas mask for the purpose of lessening the suction of war gases under the mask through the valve box.

The face portion of the gas mask is connected with the canister by a rubber connecting hose, covered with fabric and which has transverse folds (corrugated covering), which does not permit the opening in the hose to close when the hose is bent. For the purpose of connection with the canister the connecting hose has a thumb nut at the lower end which is screwed onto the elbow nozzle of the canister. The connecting hose is attached by its upper end flush against the mask valve box tube.

The mask is attached tightly to the head by means of buckles, center pads and a system of straps, part of which is made of rubber for better fixation of the mask.

The gas mask bag, made of cotton fabric, serves for keeping and carrying the gas mask. There are two compartments in the bag: one for the canister and the other for the mask.

If there is radioactive dust in the contaminated air, the bag is also a preliminary filter for filtration of the inhaled air from its large radioactive dust particles.

The mask portion is made in three sizes. The figure which indicates the size of the mask is on the chin portion. The mask is selected according to the size of the head. For this purpose, by means of a ruler with millimeter divisions, the distance from the bridge of the nose to the lower portion of the chin is determined. Depending on the figure obtained, the size of the mask is determined from the following table:

Distance (in Millimeters)	Required Mask Size
From 99 to 109	First size
From 109 to 119	Second size
From 119 up	Third size

A correctly selected mask fits against the face tightly at the margins without producing painful sensations. Careful fitting of the mask is accomplished by the necessary tension on the straps by means of the sliding buckles.

Before putting it on, one should wipe the new mask on the outside and inside with a clean rag (cotton) moistened slightly with water, and the connecting hose should be blown out.

Gas masks which have been in use are disinfected by rubbing with alcohol or two per cent formalin solution.

The correctness of selection of the mask and the good operation of the gas mask are determined in the following way: the mask is put on, the canister is taken out of the bag, the hole in the bottom of the canister is tightly closed with the palm and an attempt is made to take a deep breath. If the gas mask is in good order, air does not come into the mask. If air does come in, the gas mask is not tightly sealed and needs repair. If it is impossible to repair the gas mask it is replaced with a new one. The most reliable check of the gas mask and its proper fit on the head is made in a gas testing chamber.

For the purpose of protecting the glass of the mask goggles against fogging, a special "pencil" is used which is in the bag of every gas

mask. In doing so the glass of the goggles is carefully wiped with a clean rag, and then with pointed end of the "pencil" several streaks are made on the inside of each glass. After breathing on the glass, the lubricant applied in streaks is smeared uniformly until the glass becomes transparent. In the absence of a special "pencil" it can be replaced with ordinary soap.

Of great importance is the ability rapidly and correctly to put on the gas mask. For this purpose, preliminary training is needed. The gas mask is carried in the following three positions: "walking"-- in the absence of an immediate danger of attack; "ready"--- in the presence of an immediate danger of attack; "combat position"-- with the beginning of an enemy attack.

In the "walking" position, the gas mask is carried over the shoulder so that the bag is at the left side. In the "ready" position, the gas mask is worn on the neck with the straps short so that the mask lies on the chest in a position which makes it possible to put it on rapidly. By means of a belt or cord the gas mask bag is tied to the trunk.

For the purpose of putting the gas mask on in the combat position the following are necessary: to hold the breath, close the eyes, take off the headgear and hold it between the knees or set it down; to take the mask out of the bag and take the temple harness straps and center pad straps with both hands (with the thumbs facing inward); apply the lower part of the mask to the chin and pull the mask over the face, bringing the center pad straps behind the ears, taking their free ends with both hands and pulling so that the margins of the mask lie tightly against the face; breathe out strongly, open the eyes, and begin breathing; put on the headgear.

The gas mask is removed in the following way: the headgear is raised with the right hand; the valve box is taken with the left hand; the mask is pulled slightly downward, and with a movement of the hand upward and forward, the mask is removed; the headgear is put on; the mask is turned inside out and its inner surfaces carefully rubbed with a clean rag (or kerchief) or dried.

It is also important, when necessary, to be able to utilize a faulty gas mask. If there is a slight break in the mask, the torn place is pressed against the face with the palm of the hand or is compressed tightly with the fingers. If there is a large tear in the mask, if the goggles are broken or if damage has been done to the valves, the canister is disconnected from the connecting hose, holding the breath, closing the eyes, and removing the mask, and the elbow nozzle is put into the mouth; whereby, with the fingers of the free hand the nose is pinched, and without opening the eyes, one breathes through the mouth from the canister. In replacing the damaged gas mask by a good one in the combat position, it is necessary to hold the breath and close the eyes.

The reliability of the protective effect of gas masks depends to a considerable degree on their proper maintenance and care. Gas masks should be kept in a clean dry room, best at room temperature.

Children's gas masks. For the purpose of individual protection of suckling children, there is a child's protective chamber (DK2). It

consists of a wooden sectional frame and cover (like an envelope) made of rubberized fabric. When the cover is set on the frame, it forms a sealed chamber with a capacity of about 50 liters into which the child is put. In the cover there is a sleeve-glove for the mother's hand, by means of which, without interfering with the sealing of the chamber the child is given a nipple or a bottle with milk. There is a plastic window in it for the purpose of observing the child's behaviour. In addition, there are inlet and outlet valves in the chamber.

For the purpose of filtering the air, the canister of the civilian gas mask, connected with the chamber and containing a corrugated hose for connection to bellows, is used by means of which air is forced into the chamber through the canister. The air leaves the chamber through the outlet valve. Ventilation of the child's protective chamber is carried out by the mother or by some other person taking care of the child.

For the purpose of protecting children of more than one year of age, there are filtering gas masks similar to the civilian gas masks for adults but of smaller size and with less resistance to respiration. The masks are made in five sizes; for those designed for the youngest ages (first, second and third sizes) there are special straps which do not permit the child to remove the mask.

Cotton gauze packs. If a gas mask is not available for protection of the respiratory organs against radioactive substances and microbes, cotton gauze packs or dust respirators may be used. It should be taken into consideration that these agents do not protect against various war gases or radioactive substances if they are in a gaseous or vaporous state.

The cotton gauze packs can be prepared by members of the population from several (eight-twelve) layers of gauze or from two layers of gauze with a layer of cotton between them two-three millimeters thick. The cotton gauze packs are attached to the face by means of straps.

Respirators are widely used in those branches of industry where excessive dust is observed. There are many models of different respirators. The most acceptable are the ShB-1 ("Lepestok") ShB-2, F-45, ShF-3, R-8 and some other brands (Fig. 170). The respirators usually consist of a mask or a half-mask with a valve box and smoke filters. When cotton-gauze packs are used alone, it is recommended that dust goggles be applied tightly to the face.

Protective agents for the skin. Protective facilities for the skin are made of fabric filters impregnated with special compositions or of isolating materials (waterproof materials made of rubberized fabric or plastic film).

Isolating protective facilities give the best protection for the skin not only against gaseous but also against liquid-droplet war gases and radioactive agents as well as against bacterial agents. Clothing made of isolating material, possessing poor heat conduction, prevents heat cut-off, leads to overheating of the human body and thereby places it under stressful, unfavorable hygienic conditions. The time that one can be in such clothing, particularly during the hot season, is very limited. On the other hand, the filtering agents for protection of the skin are

light, convenient, do not interfere with heat exchange, but they do not protect the human skin against liquid-droplet war gases and radioactive substances and bacterial agents used in the form of liquid compositions.

Protective skin facilities made of isolating materials are hermetic and non-hermetic. In the non-hermetic protective clothing group are: individual protective capes, gowns, aprons, gloves, boots and stockings.

The individual protective cape is made of a special paper impregnated with special compositions. It gives brief protection against liquid-droplet war gases and radioactive substances when they are showered from the air and from bursts of chemical bombs. After a single use the cape is destroyed.

The protective gown is made of insulating protective tissue and sleeves, a hood, a belt, and is buckled on the back.

The apron is made of the same fabric as the gown and protects only the chest and abdomen.

The protective gown and apron protect only against liquid-droplet war gases in the absence of vapors, radioactive dust or bacterial agents. They are used in combination with gloves and rubber boots or protective stockings.



Fig. 170. Dust Respirator

The protective stockings serve for protection of the feet. They are made of rubberized or oil-treated fabric, or plastic and have thickened soles. For the purpose of attachment to the foot there are straps

and, for convenience in removal, there are straps in the backs.

The protective gloves and boots are made of rubber of different sizes and serve for protection of the arms and legs, respectively.

Special protective suits (Fig. 171) give the most complete protection of the skin in a locality contaminated with liquid-droplet war gases, radioactive substances and bacterial agents. Such special suits are utilized chiefly for personnel of special civil defense units (for the medical team, chemical servicemen, and others), who for a long time have to be in a contaminated locality. The special protective suits are made of rubberized or oil-treated fabric. They come in three sizes (for height less than 165 centimeters; from 165 to 172 centimeters; and for heights above 172 centimeters). The special suit consists of a hood, shirt, belt and breeches combined into a single whole. The cut of the special suit makes it possible to a certain degree to seal off the front section as well as the places where the rubber gloves go on the arms and the rubber boots, on the legs. With the aim of reducing overheating of the body in the special protective suit, a screening special suit made of cotton fabric (moleskin) is placed over it. When this suit is regularly showered with water the total time that can be spent in the protective clothing can be brought up to four hours, even in the summer.

Facilities for skin protection made of filter materials consist of ordinary clothing impregnated with special chemical compositions. Air contaminated with war gas vapors, passing through the fabrics of this clothing, is cleared of the war gas because of interaction with chemical substances with which the fabric is impregnated. This fabric also holds back radioactive dust and bacterial agents.

Protective filtering clothing consists of impregnated underwear, a pullover tunic with trousers and a cotton (moleskin) special suit with a helmet liner. Such clothing gives many hours of protection but only in the absence of liquid war gases or radioactive substances.

In the event no special protective clothing is available use may be made of handy agents for skin protection, which, by and large, give brief and less effective protection. Among these agents are the following: rubberized fabrics, plastic raincoats and capes, cotton jackets and trousers, leather mittens and gloves, oilskin, ordinary rubber footwear (galoshes and shoes) and others.

When protective clothing is used, it should be kept carefully; no tears, punctures, scratches or other damage should be permitted in it. It should be kept in a well ventilated room at a temperature of 12-16° and a relative humidity of 65-70 per cent. In keeping this material, the direct rays of the sun should not be permitted to fall on it.

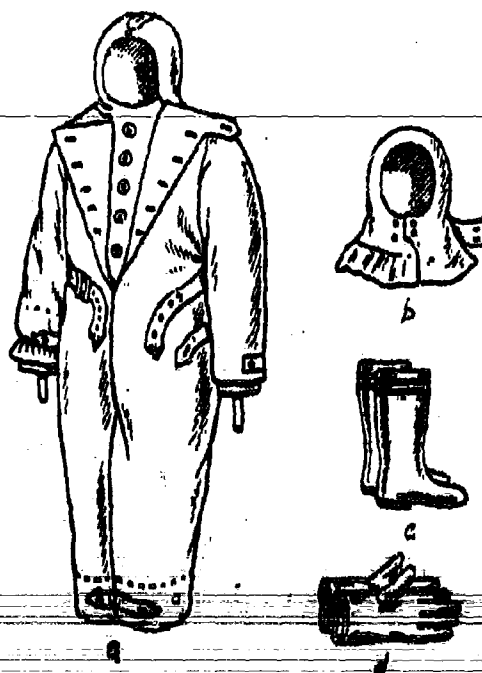


Fig. 171. Outfit of Protective Clothing. a--special suit; b--helmet liner; c--rubber boots; d--rubber gloves.

Group Protective Facilities

Group protective facilities against weapons of mass destruction afford simultaneous protection to many people and, in contrast to the individual facilities, a certain protection against the shock wave, luminous and radioactive emanation. Among group protective facilities are specially constructed or equipped shelters or cover of the simplest type.

Shelters. Depending on the volume of construction work, the presence of special equipment, the thickness and nature of the overhead cover, there are different types of shelters.

Specially constructed shelters may be located under buildings with many floors or they may be constructed separately. Separate shelters are usually dug entirely into the ground and are protected above by a thick reinforced concrete or concrete slab. Such shelters, which have several protective layers on top, have been given the name "shelters of the laminated type". As a rule, the shelters have no less than two entrances (exits); in the walls the so-called "manholes" have been provided (holes in the reinforced concrete walls covered with brick which can be broken out from within with a crowbar) for facilitating the exit of people from the shelter covered with the rubble of collapsed buildings. Underground exits are constructed at some distance from it in case the building caves in. Each shelter is divided into "compartments" on the inside by protective, hermetically sealing iron doors. On the inside, the shelters are provided with ventilation-filter apparatuses, which serve for purification of the outside air containing war gases or radioactive substances and for supplying the shelter compartments with pure air. The walls and doors of the shelter assure reliable sealing, not permitting the entrance of contaminated air. By means of the ventilation-filter apparatus excess air pressure is created for these purposes within the shelter which prevents penetration of contaminated air through small cracks and at the time of opening the doors to the entrances.

Shelters may also be underground. In such cases the layer of earth over them serves as protection. Such shelters are set up on broken terrain, where entrance to the shelter may be effected by means of horizontal or inclined galleries like deep vertical mine shafts.

Cover. Aside from specially constructed shelters, cover of the simplest type can constitute an adequately reliable measure for protection against the explosion of ordinary airplane bombs and, to a certain degree, against the explosion of an atomic bomb, if shelters are few or absent. According to the experience of Hiroshima in 1945, such cover protected the people in them even at a distance of about 300-500 meters from the epicenter of the atomic bomb explosion. They are even more effective against ordinary bomb explosions.

Cover of the simplest type is set up in the ground, with wooden-earthen overhead covering, and at some distance from buildings, so that the people in them be protected against being buried by fragments of falling buildings. Such cover may be arranged in the form of slit

trenches or dugouts (Figs. 172 and 173).

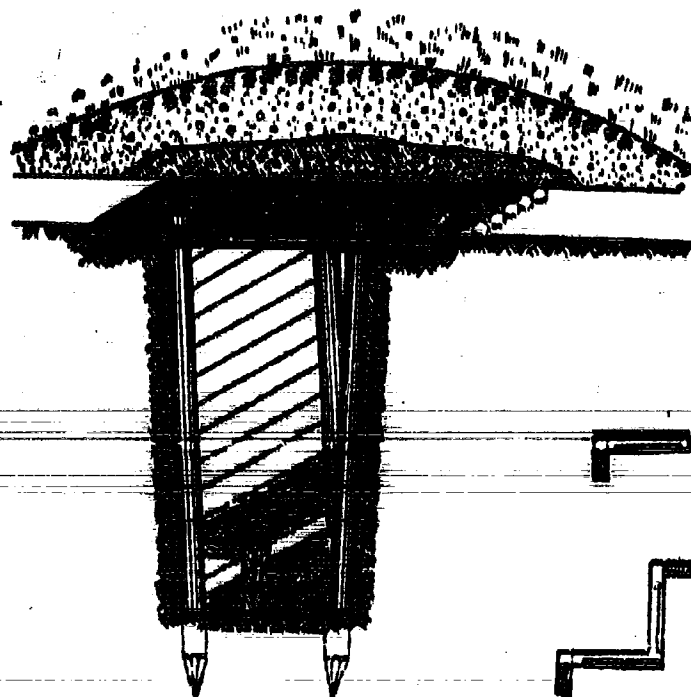


Fig. 172. Slit Trench

Even simple slits in the ground, resembling trenches, various basements, cellars, steep ravines, and others can be used as cover for the population, considerably weakening the effect of the shock wave, luminous radiation and radioactivity.

In the simplest shelters, which do not have special antichemical equipment for protection against war gases and radioactive agents, gas masks should be worn. When in shelters (cover), the population must adhere strictly to the rules of behavior in them—they must not make noise, not smoke, not litter, and they must be well disciplined and carry out all the instructions of civil defense workers.

Aside from special shelters and various types of cover,

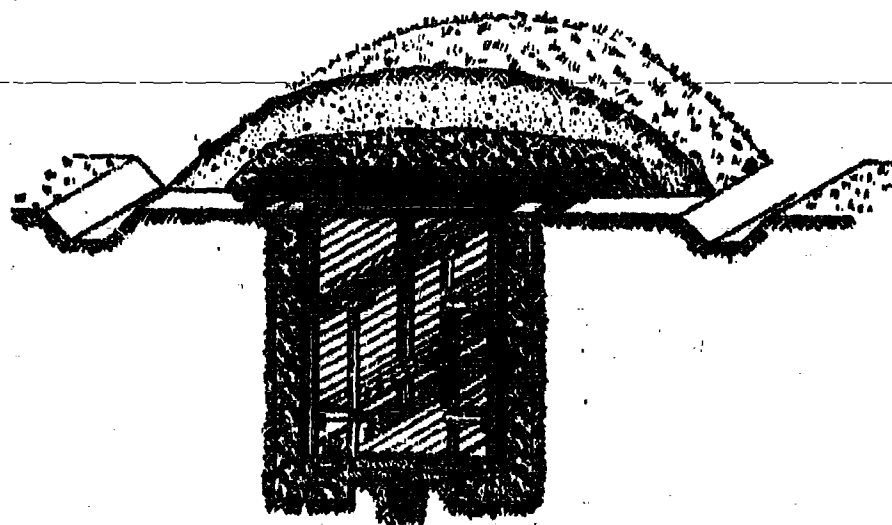


Fig. 173. Dugout

ordinary houses may be used for collective protection against war gases and radioactive agents (including radioactive dust in the wake of a radioactive cloud) as well as against bacterial agents, provided they are sealed to a certain degree by means of handy measures.

Such sealing consists of the plugging up of visible large cracks in windows and doors by means of cotton or rags with subsequent pasting on of paper strips in two or three layers. In such a sealed room a person can stay for a more or less considerable time, calculating two cubic meters of air per adult person per hour, using the volume of the premises for the calculation.

Naturally, even a relatively weak shock wave can cause a break in the tight sealing. However, after the wave passes, if the building was in a region of slight and partial damage, the window openings can be covered up with previously prepared panels, and the simplest sealing can be assured.

The general principles of utilization of facilities for individual and collective protection are the same for the city and for the rural locality. However, there are differences. In the rural locality, as a rule, there are no special shelters, and chiefly cover and various storehouses of the locality are used (root cellars, cellars, gullies and others). Aside from protection of people the protection of the large agricultural animals also assumes importance there by means of —

sealing the corresponding premises or driving the cattle out into gullies and ravines. Of particular importance in the rural locality is the protection of water, food and forage, which we shall discuss below.

Individual Protective Measures Against Bacterial Agents

Among specific individual protective measures against bacterial agents are protective measures against insect and tick bites; they are the vectors of a number of diseases. For the purpose of protecting the body against them ordinary clothing and footwear may be used. For protection of the head mosquito netting made of tulle is used which is placed over the headgear. In many cases special repellents are good protection. Among them are oily aromatic substances--dibutylphthalate, dimethylphthalate, diethylphthalate and some others. They are used for smearing the exposed parts of the body. Their repellent effect lasts from one to four hours. These preparations can be used to treat the fabric of clothing also, where it borders on the exposed skin (collar, cuffs of the sleeves).

For greater effectiveness of the mosquito nets it has been recommended that they also be dipped in special solutions. Academician Ye. N. Pavlovskiy suggested the following solution: 30 parts of lysol (or naphthalysol), 10 parts of turpentine, five parts of vegetable oil and 55 parts of water. All these substances are mixed in the order given. The nets are put into the liquid obtained, boiled for two or three hours, and then are taken out, squeezed out and dried in a dry place in the shade. In these cases, netting from ordinary fishermen's nets, which do not interfere with breathing and do not obstruct vision, is used for the mosquito nets.

A measure which protects people against many infectious diseases is that of prophylactic inoculations, which produce the so-called active immunity--resistance to certain diseases--in inoculated persons. With this aim in view, vaccines or toxoids are introduced into the human body (subcutaneously, intramuscularly or by mouth).

Vaccines are solutions of killed or living but attenuated pathogens of infectious diseases. Toxoids are bacterial toxins which have been rendered innocuous. After being injected into the body, they contribute to the production of protective bodies (substances) in it after a certain time against the pathogen of the given disease. In view of the relatively long period needed for the formation of active immunity (sometimes two weeks or more), under conditions in which a bacterial focus of infection has already been created specific sera containing already-made protective substances and creating a passive immunity are injected into the human body with the aim of protection against certain diseases. For the same purposes the so-called bacteriophage (viruses which destroy microbes) can also be used.

For the purpose of preventing the development of a contagious disease in healthy people who have been in a bacterial focus of infection and who may have been in contact with sick persons, special prophylaxis is conducted, which consists of the prophylactic administration of

certain antibiotics (biomycin, streptomycin and others) and sera effective against certain diseases.

Vaccines, antitoxic sera and bacteriophage have the general arbitrary name of "bacterials," while antibiotics are put in the group of chemotherapeutic preparations.

Antidotes and Prophylactic Preparations. Some preparations are also known which are so-called prophylactic antidotes against some war gases. When taken by mouth or in the form of a subcutaneous injection in anticipation of the use of chemical weapons they prevent or lessen the injurious effect of the corresponding war gas. Such antidotes are known, for example, against the organic phosphorus war gases of the soman type.

At the present time, scientists are having some success in the study of drugs for chemical prophylaxis of even such a serious affliction as acute radiation sickness. Some substances have been investigated which, when taken in the form of tablets or injected subcutaneously or intravenously before the action of radiation on man, can prevent or lessen the acute radiation sickness which develops.

Protective Sanitary-Hygienic Measures

Ruined buildings, fires, obstructions, water supply and sewage systems which have gone out of order and others create extremely unfavorable sanitary-hygienic conditions for the population which has been partly preserved in an atomic focus of destruction, contributing to the occurrence and spread of epidemic diseases. An unfavorable sanitary-hygienic situation is also created in the suburban area, in the rural regions around the damaged city. The evacuated population of the damaged city is added to the population of these regions; in addition, the collecting hospitals of the evacuation base, which receive a large number of injured persons for the purpose of giving them specialized aid and treatment, are located on the same territory. Such great crowding creates an unhealthy sanitary-hygienic situation. Finally, contamination of the locality with radioactive substances represents a great hazard.

In a chemical focus of destruction there are no ruined buildings, no fires or obstruction, but an unhealthy sanitary-hygienic situation is created, aside from direct injury to people, by the danger of contamination of the locality, structures, various objects as well as water sources and provisions.

In a bacteriological focus of contamination the danger is created not only of direct infection of people by the pathogens of the infectious diseases but also, just as in a chemical focus of contamination, the infection of sources of water, provisions and forage is a great hazard.

The general supervision of the necessary sanitary-hygienic and antiepidemic measures in atomic, chemical and bacterial foci of destruction is the responsibility of the sanitary-epidemiological stations. The characteristics and contents of the antiepidemic measures are given in chapter IX.

As far as the sanitary-hygienic measures are concerned, they amount to the following, by and large: protection of water sources and provisions in storehouses, grain elevators, food enterprises, public dining rooms and individual water and food supplies; testing and expertise with the aim of drawing conclusions as to the suitability of water and food products for consumption; sanitary control of the proper utilization of individual and collective protective measures; deactivation, disinfection and degassing of contaminated territory, buildings, equipment, living quarters, etc.; sanitary processing of the population and deactivation, degassing and disinfection of the clothes and footwear of the affected population; the organization of provisional water supply until the water supply system is restored as well as the organization of food supply with observance of the necessary protective measures; setting up provisional toilet construction, straddle trenches and the taking of other measures for prevention of contamination of inhabited places in which the sewage system has been destroyed or in which there is none; strict observance of the rules of personal and community hygiene by the population.

In the taking of all these measures the sanitary-epidemiological stations are given basically control functions. The measures are taken directly by the appropriate civil defense services (those for emergency-rescue, decontamination of territory and buildings, sanitary processing and decontamination of clothing, goods and food) as well as by the population itself. For taking many of these measures the personnel of mass active units of the civil defense medical service is brought in-- personnel of aid stations and medical teams as well as nurses.

A very important protective measure after the action of radioactive substances and war gases as well as bacterial agents on man is medical processing. It may be partial or complete. Partial medical processing is conducted immediately after coming out of a contaminated area and is used when there is a danger of action of war gases or radioactive agents on the body surface. After contact of drops of war gas with the exposed parts of the body these parts of the skin are treated with fluid from the individual gas casualty first aid kit, in accordance with special instructions appended to it and studied beforehand. In the case of contact of radioactive agents with the exposed parts of the body (face, neck, arms), they are washed with uncontaminated water or wiped with cotton pledgets or a piece of any clean material copiously wet with water or fluid from the individual gas casualty first aid kit.

In all cases, at the first opportunity, partial medical processing is completed with the use of complete medical processing. Complete medical processing is conducted either at special institutions--fixed washing facility stations (SOP)--or in any premises equipped with showers, and bath-houses.

The fixed washing facility stations are usually set up at ordinary bath-houses and shower-room pavilions by means of an additional adaptation, which may be made beforehand.

Each SOP should operate like a sanitary control post so that those who have been given medical processing move in the same direction

and those who have been processed not come into contact with those not yet processed.

Complete medical processing consists of careful washing with soap and a fast-wisp (sometimes, when possible, special detergents can be used instead of soap) under a shower.

Those involved are first admitted to the undressing room, where they remove clothing and footwear, which are sent for decontamination (disinfection, degassing, deactivation). In the undressing room, in cases where war gas or radioactive agent injury is possible, the mucous membranes of the eyes, nose and mouth are washed with a weak alkaline solution (0.5 percent sodium bicarbonate).

Then, the affected persons are sent to the shower department for washing and then to the dressing room, where they put on their decontaminated clothing. When there is a danger of injury by radioactive agents the quality of the medical processing is checked on by a dosimetrist, and when necessary the processing is repeated.

If radioactive substances come into contact with the clothes, various articles, provisions, forage, etc. deactivation is performed for preventing their injurious effects.

The removal of radioactive agents from the clothing, provisions and various articles is called "deactivation." Depending on the circumstances and the agents used, deactivation may be complete or partial.

The quality of deactivation is determined by dosimetric control.

Partial deactivation consists of shaking out the clothing and rubbing its surface with uncontaminated rags, straw, snow, etc.

Complete deactivation consists of the careful beating out of the clothes, washing of footwear and other articles with a strong stream of water, rubbing with pledgets containing solvents, and washing the clothing in washing machines.

Measures for the removal and neutralization of war gases in a contaminated locality and on various objects, including clothes and footwear, are called degassing.

Degassing methods are divided into mechanical, physical (physicochemical) and chemical.

The mechanical method consists of the removal of the contaminated layer of soil, snow, plastering, etc. or of the destruction of contaminated articles of little value.

The physical method (physicochemical) of degassing consists of the removal of the war gas by means of special solvents (kerosene, gasoline, and others) or treatment of the contaminated articles and objects with hot air or steam in special chambers.

The chemical methods of degassing are based on the action of certain chemical agents on the war gas with the aim of converting it to harmless substances. These agents are called degasifiers; among them are: chloramine (1-5 percent solution) and chloride of lime used in the dry form or in the form of milk of lime (one part lime to two parts water) or putty (two parts lime to one part water).

For the purpose of degassing a locality by means of degassing agents special apparatuses are used: the PDM--locality degassing

Apparatus; the RDF--portable degassing apparatus, and others.

Protection against Radioactive and Bacterial Agents and War Gases. When an enemy uses nuclear, chemical or bacteriological weapons there is a great danger of contamination of water sources, food products and forage, which may be the cause of involvement of a large number of people and animals.

After the explosion of nuclear bombs radioactive contamination of water sources and food products occurs in the immediate vicinity of the blast because of induced radioactivity, but on this part of the territory affected the food products will be destroyed by the shock wave and the luminous radiation. For practical purposes, the greatest danger is that of contamination of water sources, food products and forage with radioactive dust falling out in the wake of the radioactive cloud, frequently over a considerable territory in the direction of the prevailing winds. The radioactive dust usually settles on the surfaces of open water bodies and unprotected reservoirs as well as on the surfaces of any unprotected food products. Only in the event of rainfall or snowfall in the path of the radioactive cloud can the radioactive substances penetrate into the food product through a loose wrapping or container. Consideration should be given to the great danger of contamination of unprotected food products, forage and water sources with vapor and liquid war gases and bacterial agents. The depth of penetration of liquid war gases into food products depends mainly on the size of the war gas droplets and the nature of the food product. In such food products as cereal and greats the war gas droplets can penetrate to a depth of seven centimeters; into meat, two centimeters; into vegetables, two centimeters. Many war gases penetrate particularly easily into fats because of their great solubility in them. The effect of the war gas in the vapor or gaseous state is less dangerous, but only if contact is brief. The degree of contamination of water bodies by war gases is determined to a considerable degree by their solubilities in water and by their specific gravities.

Contamination of water sources and many food products by bacterial agents is a great danger also, because the pathogens of a number of infectious diseases multiply rapidly in water and particularly in such food products as meat and milk. After entering the water of even a small section of a river, microbes, multiplying rapidly, can contaminate the river far down its course. This applies particularly to the pathogens of such infectious diseases as cholera and typhoid fever. In large fast-flowing rivers a small area of contamination may be of no danger because of the movement and mixing with large uncontaminated quantities of water with the simultaneous action of the sun and other disinfecting factors. At the same time, small and stagnant water bodies, particularly unprotected wells, may be infected for a long time. Tap water offers the least danger of infection if the water works are intact and if requisite additional protective measures are taken (for example, chlorination of the water with increased doses of chlorine with the danger of bacterial contamination; additional sealing of the main water works and additional water purification by special physicochemical methods in the event of a danger of

contamination with radioactive agents or war gases.

In connection with the danger of contamination of water, food products and forage by war gases, radioactive and bacterial agents, special protective measures, taken partially even in peacetime and acquiring the greatest significance under wartime conditions during application of weapons of mass destruction by an enemy, assume great importance.

Measures for the protection of food products basically amount to sealing of storehouses containing food and forage as well as packing food products in protective containers and using special enclosed transport for carrying them. The ordinary hermetically sealed metal can or glass jar used for canned goods and vegetable preserves possesses the best protective properties. Ordinary dense wooden and plywood boxes for the most part protect food products against radioactive dust, vapor or smoke war gases and bacterial aerosols. However, these boxes do not offer a full guarantee against contamination; their protective effects are limited to one period of time or another depending on a number of conditions.

Best protection is given by rubberized or plastic (made of polyethylene and other plastics) fabrics, with which food products are carefully wrapped. Ordinary bags or, even better, canvas or laminated paper containers (multiwall paper bags) constitute partial protection against the brief effect of vapor-form gases and even better protection against gaseous war gases and bacterial aerosols.

Tight sealing of storehouses and food enterprises amounts basically to covering extra windows and doors with brick and subsequent plastering, and the careful closure of various cracks. Outside doors are lined with canvas, felt or leather after an entrance with an air lock is set up with two or three doors. The frames of doors and windows are fitted tightly, caulked up, and the window glass is carefully secured with cement, and two or three layers of paper strips are glued on. The duct openings of the air inlet-outlet ventilation are equipped with protective valves or safety fasteners. Where possible, production equipment (automatic lines) at the public dining room enterprises is made air-tight. For prevention of rodent penetration into vent holes metal screens are placed in the closed air vents.

Food products, grain and forage kept in clamps, stables or in bulk are put under hay sheds and carefully covered with canvas or several layers of burlap or matting. They are particularly well covered up at the sides on the bottom, packing them additionally with straw, branches and pouring a layer of sand over them. Reservoirs with pure water (cisterns, tanks and basins) in food industrial enterprises and in the public dining rooms should have air-tight covers.

Sheds are set up over well shafts to avoid contamination of them. The framework should have a tight-closing cover. A community bucket on a chain is used for drawing water; a closed cabinet or a box at the side of the framework is used for the bucket. A layer of clay 30 centimeters thick and 1.5-two meters wide is placed around the curb, and sand 15 centimeters thick is poured over the clay.

Artesian wells are automatically protected against war gases, radioactive agents and bacterial agents and need only safeguarding of and cleanliness in the places from which the water is drawn.

Individual drinking water supplies are adequately protected by being kept in decanters, thermos bottles, cans and jars if these have tight-fitting (air-tight) covers (or stoppers).

In rural rayons the same rules are used for protection of water sources and food products. Hay ricks, straw stacks and stacks of unmilled grain, flax or hemp are topped on an incline. Cereal, flour and other friable products should be kept in bags, boxes or bins with tight sealing covers. Potatoes, cabbage and other fresh vegetables should be kept in cellars, cellars under the floor and storerooms which have tight closing doors (hatches) with air-tight walls and ceilings. Meat, butter, curds and fruit can be kept securely in barrels as well as in glass containers or earthenware with tight covers.

Under conditions where the use of agents of mass destruction by an enemy is possible, the need arises for determination of contamination of water or food products with war gases, radioactive and bacterial agents for the purpose of deciding the question of whether or not it is possible to use them for the population. Such a determination has been given the name of "indication," according to the results of which the expertise is accomplished. In a number of cases war gases and radioactive agents are permitted to be present in water and food products in certain quantities, within limits or the so-called permissible doses. Such permissible doses are determined on the basis of special scientific investigations, which determine whether or not a given volume of radioactive agent or war gas per liter of water or per kilogram of weight of some food product or another is innocuous.

For some food products these doses may be determined with consideration of culinary processing, under the influence of which the war gas present in the product is completely or partially neutralized (or destroyed). Determination of the permissible doses is necessary, because the complete decontamination of water or food products may take a long time and is sometimes impossible, for practical purposes, with the existing imperfection of some methods of detoxifying food products and water.

Detection of war gases and radioactive agents in the locality is made by the civil defense chemical service. The civil defense medical service is given the responsibility of organization, detection and the expertise of water and food products with respect to war gases, radioactive and bacterial agents. The detection may be accomplished by the official laboratories of the water works and food enterprises. As a rule, detection and expertise of water and food products conducted by the civil defense medical service are performed by the sanitary-epidemiological stations (republic, oblast, kray, and city) and by the sanitary-epidemiological departments of the rayon rural hospitals, which have laboratories with the following departments for this purpose: radiological, sanitary-chemical and bacteriological.

For the purpose of carrying out the detection according to special instructions a selection of water and food product samples is made which are sent to the appropriate laboratory.

Samples of food products are taken in quantities of 25-50 grams each from each batch of food products, from the upper layers in those places where there is the greatest probability of contamination. From the liquid products samples are taken after mixing. Water samples are taken in a quantity of 0.5 liter. Samples are taken from the surface and from the bottom (or from the depths) of open water bodies. The samples are put into hermetically sealed test-tubes, flasks and bottles with the observance of precautions; labels with inscriptions indicating the date, place and name of the product (material), aim of the examination, and who took the sample are pasted onto them.

Samples for bacteriological examination are taken according to a special method, in which persons engaged in taking such samples for detection purposes should be trained.

Before the results of the expertise are received the use of water sources and food products which were in the region of employment of agents of mass destruction is forbidden. Through the personnel of the civil defense guard and safety service, posts are set up for assuring the necessary protection in places where such water sources and food installations are found.

Decontamination (degassing, deactivation and disinfection) of food products and water requires taking special measures under the general supervision and control of the civil defense medical service on the basis of the corresponding instructions.

The great toxicity of modern war gases and the resistance of a number of infectious disease pathogens to high temperatures and certain disinfectants require good knowledge of the special methods of degassing and disinfection for various food products and water. In performing deactivation it should be taken into consideration that radioactive agents cannot be destroyed, and they cannot be made to decay quickly artificially. The period of natural decay of radioactive agents differs for different radioactive isotopes, and in practice deactivation amounts to a mechanical removal of the radioactive agents from the surfaces of food products and to filtration or coagulation of it by special physicochemical methods in water.

Disinfection of water amounts to a careful boiling of it in small quantities or to purification of it at the water works and chlorination. A method has been developed for chlorinating water in wells and for small quantities of water. This method is described in Chapter VIII.

Individual supplies of food products sealed in air-tight containers can be used only after deactivation if radioactive agents fall on the surface of the container. It consists of the careful wiping of the surface of the container with a rag in the open air and then washing it with running water from a hose or watering can.

In deactivation individual safety measures should be observed, and it should be conducted with a gas mask on and in protective clothing.

Organization of Medical Care, Treatment and Nursing Care of Radiation Injuries

Medical First Aid for those Involved and the Treatment of Radiation Sickness

Medical first aid is rendered by aid stations and aid-men teams. Simultaneously, beginning with the focus of attack, those injured should be sorted. In sorting, the urgency of aid, presence of radioactive contamination are determined; and if the patients are to be sent to specialized hospitals, the category of patient is determined.

In the focus of destruction medical first aid to those afflicted with radiation injuries caused by the external effect of radiation largely consists of manual evacuation of the injured. During the first few hours after irradiation, during the period of the initial reaction, the condition of the patient may be serious. Not only in severe but also in moderate cases of radiation sickness appreciable disorders of cardiac activity and of the nervous system can be observed. Observations made in Japan and numerous experimental studies have shown the extremely unfavorable effect of any physical strain during the initial reaction; therefore, in giving aid before the patient is seen by a physician the main therapeutic factor should be rest. It is essential to bend all efforts to provide manual evacuation for the patients rather than permit them to go on foot to the medical first aid detachment (OPM).

In rendering aid to patients who have been in a locality contaminated by radioactive agents measures should be taken first of all for preventing the entrance of radioactive substances into the human body. It is forbidden for the patients to sit on the ground, drink, smoke, touch objects around. The visible radioactive debris should be shaken off the clothes and body. For cleaning the clothes and skin a brush or rag may be used. For cleaning the skin material capable of scratching the skin should not be used, because radioactive agents can penetrate into the blood through the scratches.

Those contaminated with radioactive agents should be sent out separately, not mixing them with the patients without radioactive contamination.

Where contamination with radioactive agents is found those involved should be given careful medical processing at the OPM. It should be taken into consideration that radioactive agents do not go through the clothes, and, for this reason, the exposed parts of the body are mainly contaminated. Medical processing at the OPM consists of careful, five-minute washing with warm water and soap under a shower. First, the most contaminated parts of the body are washed--the face, head, arms and then the other parts. The washing should be accomplished with a bast-wisp or soft brush. The parts of the body covered by hair, folds of the skin, and under the nails should be washed with special care. The nose, eyes and mouth are washed out with two percent sodium bicarbonate solution. Hair contaminated with radioactive substances is best shaved off, because washing very

incompletely removes the radioactive agents from it.

Clothes and footwear onto which radioactive agents have fallen are deactivated. In the case of a high degree of contamination of clothes and footwear, they are best put into hermetically sealed containers and buried in the ground. In this case, different clothing should be issued to the patients.

At the OPM medical sorting of the patients is carried out, and first aid is rendered by a physician. The urgency with which medical aid is needed is made the basis of sorting.

Medical aid is needed first by those in a state of asphyxia or shock, with severe bleeding, those with penetrating chest, abdominal or skull wounds and, in addition, persons with radioactive contamination.

In the case of suspicion or, particularly, after obvious entrance of radioactive substances into the digestive tract in the water or food the stomach should be washed out. First, the patient is given barium sulfate (50 grams), bone meal (50 grams) or kaolin (50 grams) by mouth. After 15-20 minutes a stomach tube is passed into the stomach (a tube made of elastic rubber, 70 centimeters long, with a lumen of 8 mm and walls 1-2 mm thick; at the blind end of the tube, introduced into the stomach, there are two oval holes, through which the gastric contents enter the tube; at a distance of 40 centimeters from this end there is a mark). The technique of passing the tube is the following: the patient sits on a chair and bends his head forward. The nurse, who stands to the right of the patient, introduces the tube as far as the pharynx with her right hand, and, using the patient's reflex or voluntary swallowing movements, rapidly passes the tube through the esophagus until the mark is at the level of the front teeth. After this, a glass tube is attached to the outer end of the tube, and a rubber tube with a funnel of 500-1000-cc capacity is set on it. The funnel is lowered below the stomach level and filled with warm water, after which it is raised above the patient's head, and the water fills the stomach by the force of gravity. Then the funnel is quickly lowered, and the water from the stomach comes back into the funnel. Care should be taken in lowering the funnel that there always be a little water in it; otherwise, it will be difficult to pump the latter out of the stomach because of the entrance of air. Water is poured out of the funnel into a basin, the funnel is again filled with water and raised; the stomach is washed, the funnel lowered, and the water poured out. The procedure is repeated until the wash water no longer contains radioactive agents.

If it is impossible to wash out the stomach the patient is given an adsorbent, and 15 minutes later he drinks a glass of warm water and induces vomiting himself mechanically. It is desirable that the patient vomit several times. If this is not successful, vomiting is induced by the subcutaneous injection of 0.5 cc of one percent apomorphine.

Twenty minutes after evacuation or washing out of the stomach a purgative is given--a tablespoonful of Epsom salts in a glass of water.

In radiation sickness caused by external irradiation only, the

therapy at the OPM consists of the use of symptomatic agents. In the case of pronounced excitation the patient is given a three-percent sodium bromide solution (one tablespoon), thorazine, amobarbital in a dose of 0.2 gram, dimedrol /diphenhydramine/ 0.02-0.05 gram by mouth; in severe cases, a subcutaneous injection of one cc of one percent morphine solution is given. In the case of cardiac activity disorders (fast weak pulse, quickened respiration, dyspnea, pallor) cardiac agents are prescribed--coramine (30-40 drops), atrophanthin (five drops), camphor (0.2 cc), or adenilan (20 drops). In the severe forms of radiation sickness 200,000 units of penicillin are injected intragluteally.

All patients with radiation injuries, with the exception of those with very severe forms of the sickness, for whom transportation becomes possible after the lessening of the symptoms of the first period, should be evacuated.

Before transportation the patients are given sedatives (one cc of one percent morphine solution or one cc of two percent pantopon solution, 0.02 gram of thorazine by mouth) for the prevention of complications associated with the transportation. In the therapeutic hospital of the suburban zone treatment begun at the OPM is continued. Patients with radioactive contamination should be given sanitary processing repeatedly until complete elimination of the radioactive agents. If a second washing with water and soap does not lead to the removal of the radioactive substances chemical agents may be used, for example, a mixture of barium and starch, weak sodium bisulfite solution or a paste made of titanium dioxide. The paste is applied to the contaminated skin surface and is removed after two minutes; then the skin is washed with soap and hot water. Hair contaminated with radioactive agents should be shaved; the nails should be cut short. The stomach should be washed out repeatedly until the wash water is free of radioactive substances on a radiometric check. After washing out the stomach a purgative (salt) and enemas are prescribed for removing the radioactive agents from the intestine.

For the purpose of accelerating the excretion of radioactive substances from the body a course of treatment is given with complex-forming preparations (EDTA--the disodium-calcium salt of ethylenediamine tetraacetic acid; or with the disodium-calcium salt of 1-2-diaminocyclohexanetetraacetic acid). The preparations are injected intravenously in the form of the 10-percent aqueous solutions in doses of 20-25 cc twice or by the drip method once in a quantity of 40-50 cc. First, the preparation is diluted in isotonic saline solution. The infusions are given for three or four days; then there is an interruption made for the same period, and the infusions are repeated for three or four days. The course of treatment lasts one month. For the purpose of combining with radioactive agents which have entered the respiratory tract these preparations are introduced endotracheally in the form of aerosols.

Contraindications to the use of EDTA and complexin /the disodium-calcium salt of 1-2-diaminocyclohexanetetraacetic acid/ are diseases of the liver, kidneys and urinary tract.

Aside from complex-formers, copious fluids, diuretics, diaphoretics and vitamins B₁ and B₂ are prescribed.

In the hospital those suffering from external or internal irradiation are put on strict bed rest for the entire sickness, including the second period. It is desirable to exclude strong stimuli (noise, bright light), because even ordinary stimuli are excessive for patients with radiation sickness. It is necessary to calm the patient as much as possible. In the presence of pronounced restlessness sedatives are recommended--bromides, amobarbital, thorazine (in a dose of 0.025 gram), pantopon, and, if necessary, morphine. Dimedrol diphenhydramine is prescribed as a must. If there is a cardiac activity disorder coramine, campher or convallaria drops are indicated. For nausea and particularly vomiting gastric irrigation is indicated with physiological saline solution; for diarrhea, aureomycin, biomyoin, levomyocetin in doses of one gram a day.

The patient should have a diet rich in protein and vitamins. The food should be ground up well and should not be irritating. During the first period eggs, sour cream, clotted milk, liver in the form of a meat pie, curds, chopped meat and fruit juices are recommended. In the second period the diet may be more varied, chiefly protein and rich in vitamins. In the third period, in connection with the marked reduction of secretion and of the activity of enzymes dishes which stimulate the flow of gastric juice are needed--bouillon, fish-soup, acidophilus milk up to 1-1.5 liters a day, raw eggs, chopped meat, fish, milk, curds, fruit and fruit juices.

In case of frequent vomiting, when the patient does not hold food on his stomach, nutrient enemas are prescribed. An hour before the nutrient enema an ordinarily cleansing enema is given. The total volume of fluid used in the enema should not exceed 100-150 cc. Bouillon, raw egg yolks, glucose, salt, and alcohol are used for the enema. For example, 50 cc of red wine, 20 grams of glucose, and 50 cc of water or 100 cc of bouillon, 1.5 grams of salt, and two egg yolks. The mixture prepared is heated to 37-38° and introduced by means of a rubber bulb. After the enema the patient should lie down without moving for an hour so that the fluid introduced does not flow back out. Instead of a single nutrient enema, drip enemas may be used. Thereby, use is made of a long rubber tip and an Esmarch bag with a cock which is opened enough to allow the fluid to come out in drops. For drip enemas 5-10 percent peptone solution and milk are used.

Patients should be given attentive nursing care. The severe trophic disorder in radiation sickness contributes to the development of bed-sores. Care should be taken that the bed be soft, comfortable; that there be no folds or crumbs on the sheets or linen to cause bed-sores. When a patient lies on his back for a long time the skin and soft tissues of the sacral region are subjected to considerable pressure. With the aim of prophylaxis of bed-sores a rubber ring should be placed under the patient.

If the patient is in serious condition, and he cannot be given hygienic baths regularly, it is necessary to rub the skin daily with a solution of vinegar and alcohol. Frequently, the skin becomes dry in patients with radiation sickness, with a tendency toward the formation of cracks. In these cases the skin should be smeared with

various fats (cosmetic cream) .

The reduction of immunity in the patient's body makes infection from any source dangerous. In the mouth of even a healthy person there are microbes which present no danger in the normal condition. With weakening of immunity these microorganisms become pathogenic for the patient. In connection with this, care of the oral cavity assumes very great importance. The teeth and mucous membranes of the mouth should be mechanically cleaned of film daily and rinsed carefully with solutions of boric acid, rivanol and potassium permanganate. In the event there are ulcerations and areas of necrosis in the mouth, the use of antibiotics is required--penicillin, gramicidin, or furacillin.

Beginning with the first few days of the sickness and during the third period dimedrol is prescribed in a dose of 0.03-0.05 gram. For the purpose of reducing the rate of tissue metabolism pyridoxin (0.01 gram) is given for the first three days; for prophylaxis of the hemorrhagic syndrome citrin or rutin (0.02 gram), thiamin (0.01 gram), vikasol /vitamin K analogue/ (0.015 gram) are prescribed. In connection with the marked reduction of the ascorbic acid content in the body, intravenous infusions of glucose with ascorbic acid and vitamin B₁ are given. Ascorbic acid in a dose of one gram a day is prescribed by mouth. During the first and third periods of radiation sickness vitamin B₁₂ is prescribed, which contributes to the recovery of deoxyribonucleic acid synthesis.

The use of antibiotics is of great importance among the other therapeutic agencies. In the severe form of radiation sickness antibiotics are prescribed beginning with the first day and are used until recovery occurs.

In the case of sickness of moderate severity the antibiotics are prescribed from the time of development of manifest leukopenia until the end of the sickness. In the mild form of the sickness antibiotics are used according to indications. With the use of a combination of antibiotics consideration should be given to the possibility of habituation. One antibiotic is given intramuscularly; another, orally. Every seven-eight days the antibiotics should be changed. The marked functional disorder of the hematopoietic organs (developing aplasia) requires blood, plasma, erythrocyte, leucocyte and platelet mass transfusions.

Transfusion of blood and its preparations is carried out as replacement therapy which is stimulating and eliminates or reduces intoxication.

In the severe forms of radiation sickness exchange blood transfusion (bleeding of 500 cc with subsequent replacement with blood or plasma) is indicated in the first few days. Subsequently, infusions of 150-200 cc of blood or plasma are recommended every three days. During the third period whole blood is poorly tolerated by the patients, and for this reason it is more advisable to prescribe infusions of erythrocyte, leucocyte masses and plasma. For the purpose of reducing possible severe post-transfusion reactions it is recommended that dimedrol or morphine be given before the transfusion. In the case of sickness of moderate severity, it is possible to limit the

treatment to the use of blood-substitutes (polyvinylpyrrolidone, polyglucin [product of partial hydrolysis of dextran with HCl], and protein hydrolysates) in a dose of 250-500 cc daily for the first few days for the purpose of controlling intoxication. In the second period it is desirable to give transfusions of whole blood in doses of 150-200 cc; in the third period, to transfuse plasma, erythrocyte, leucocyte and thrombocyte masses as indicated. During the recovery period a switch can again be made to whole blood transfusions.

For the purpose of improving the digestive functions pancreatin and hydrochloric acid are prescribed beginning with the end of the second period; during the third period, suprarenal gland preparations (desoxycorticosterone, cortin) and the adrenocorticotrophic hormone of the hypophysis are prescribed.

For weakening of cardiac activity agents are prescribed which raise the blood pressure and stimulate cardiac activity.

For complications, which are observed more often in the second half of the third period, the antibiotic dose is increased.

In the treatment of any diseases drugs exert a more rapid and more complete effect if they are given subcutaneously, intramuscularly or intravenously. This applies as a whole to the treatment of radiation sickness, particularly since severe trophic changes of the gastrointestinal tract lead to a reduction of absorption by the gastrointestinal mucosa.

At the same time, beginning with the first few days of radiation sickness, there is a disorder of tissue permeability and a slowing of the circulation, which causes an impoverishment of the absorption conditions for subcutaneous administration of drugs. During the second period the tissue permeability and the circulatory rate return almost to the original condition, but in the third period the permeability is impaired to an even greater degree than in the first, there is again a slowing of the circulation; the blood vessels become fragile; there is a delay in blood coagulation, and a hemorrhagic tendency is found. During this period the slightest trauma, including subcutaneous or intramuscular introduction of an ordinary syringe needle, leads to bleeding. Any hemorrhage in the third period can undergo necrosis and ulcerate; therefore, during the third period the subcutaneous, intramuscular or intravenous injection of drugs is given only according to strict indications and at the order of the physician. For subcutaneous injection an area is selected which is at a distance from large arteries, nerve trunks and does not have an extensive system of superficial veins. In this respect the posterior surface of the arm, outer and anterior surfaces of the thigh and the skin of the abdomen are most suitable. The injection is given with a fine needle, and the drug is injected slowly. At the end of the injection the puncture site is pressed with a piece of cotton and alcohol until it is certain that it is not bleeding.

In exactly the same way, in the intravenous infusions, the thinner the needle and the more slowly the infusion is given the less danger there is of subsequent hemorrhage. After intravenous infusion a dressing is placed on the injection site. Subcutaneous infusions of large

quantities of solution, for example, physiological saline, cause the greatest injury. In view of this, subcutaneous injections should be avoided as far as possible, replacing them with less traumatic intravenous infusions, administration of fluid by mouth, and drip enemas.

Attentive care of patients during the third period is of very great importance and not uncommonly determines the outcome of the sickness. In the opinion of Japanese physicians who have had radiation sickness, nursing care, rest and a suitable diet are of even greater importance than drug therapy.

In the phase of recovery recurrences of the sickness may be observed which require appropriate treatment. In radiation sickness recovery is incomplete. For a long time cerebraesthesia with reduction in the speed of the nerve processes, loss of memory are maintained; there may be anemia and leukopenia, chronic enterocolitis, and a tendency toward infectious diseases.

During the period of recovery the nursing care and maintenance conditions of the patients are also important factors determining the speed and completeness of recovery of the patients' health. Absence of the necessary conditions not uncommonly contributes to recurrences of the sickness.

Among all the factors the adequate supply of oxygen, the diet and gradual, depending on the patient's condition, increase in the physical and mental loads are of the greatest importance. The ability to absorb oxygen from the air is inhibited throughout the sickness, and oxygen deficiency develops in the body. During recovery the absorption of oxygen does not return to the normal level for a long time, in connection with which convalescents should be in sanatoria and rest homes where the air is pure and has an adequate oxygen content.

For a long period after radiation sickness cachexia is observed in the patients, with a marked impoverishment of vitamins and proteins, and inadequacy of gastrointestinal activity. In connection with this, the food should be varied but mild, readily digestible, rich in proteins and vitamins. The exhaustion of the central nervous system and the long-maintained weakening of functions of all the other systems make physical or mental overstrain dangerous. Any excessive strain can lead to a recurrence of the sickness. However, neither prolonged physical or mental inactivity contributes to rapid recovery. The load should be increased gradually, with consideration of the patient's individual characteristics and under the control of an experienced physician.

Treatment of Radiation Burns

In the case of first-degree surface radiation burns, caused by the emanation of radioactive agents, the injured skin should be protected against any stimulation, among which are washing with soap, the rays of the sun, the wind and, particularly, the effects of any chemical agents. The injured skin is smeared with fat,

vegetable oil and neutral creams. The erythema disappears in several days, scaling begins, at the end of which the skin remains pigmented. During all this time the resistance of the skin to external stimuli is reduced.

In second-degree burns with the appearance of hyperemia the treatment is limited to smearing fats. In the event of appearance of blisters a dressing with synthomyoin emulsion, penicillin ointment and Lassar's paste is applied to the wound surface. The scars remaining after healing are distinguished by lack of resistance. The sun's rays and chemical stimuli can cause the formation of cracks, excoriations and second-degree burns on them.

In the case of third- and fourth-degree burns a novocain field block is needed; in the case of ulcer formation, antibiotics are used for controlling secondary infection, and preparations are applied which contribute to liquefaction and removal of the necrotic masses. Among them are the grafting of preserved skin, pepsin solution, and hexerol. After the ulcer surface becomes clean drugs are used which stimulate granulation-tissue formation and epithelialization (aloe emulsion, thesane /Thesium minkwizianum alkaloid/emulsion, and fibrin film).

After healing, the ulcer scars are less resistant than after second-degree burns. Ulcers can occur on such scars even without an apparent cause, requiring prolonged treatment.

The prognosis is even more serious in radiation burns caused by the effect of penetrating radiation (hard x- or gamma-rays or neutrons).

In the case of burns of all degrees a field block with novocain is necessary, or, if this is impossible because of the large size of the burn surface, a vagosympathetic or paranephric novocain block should be performed. In the case of a first-degree burn a single block is all that is needed; in the case of second- and particularly third- and fourth-degree burns the block is performed repeatedly; in the acute stage, every one-two days and in the chronic stage, every five-seven days. The block reduces pain, edema, and improves the subsequent course.

In the case of a first-degree burn the block and smearing with oil or fat are all that is needed.

In the case of a second-degree burn repeated blocks are required; in the event of blister formation, dressings need to be used (the same as for superficial second-degree burns).

In the case of third- and fourth-degree burns intraarterial injection of 0.5 percent novocain solution is given, and morphine and other analgesics are prescribed for the purpose of reducing pain and edema, in addition to the novocain field block. For the treatment of ulcers ointments containing antibiotics are used. After subsidence of the acute phenomena surgical excision within the limits of the healthy tissues is extremely desirable. If the operation is impossible prolonged ointment treatment is given, directed at cleaning the ulcer. For the treatment of such ulcers general tonic measures need to be used which can contribute to more rapid healing of the ulcers.

Medical aid for radiation injuries is organized on the principle

of a two-stage system. First aid is given in the focus of destruction. The first stage is constituted by the first aid detachments, where first aid is given by a physician. The second stage is at the specialized hospitals in the suburban region, where the patients are given specialized medical aid. All measures for rendering medical aid depend on the caliber of the nuclear bombs and their type of explosion --air or ground (or underground)--and on a number of other conditions. Therefore, there can be no standard organizational system for medical aid. In the event of an air blast there may be no radioactive contamination of the locality, which makes it possible to reduce dosimetric monitoring and the work of sanitary processing and deactivation to a minimum.

In the case of explosions on the ground medical aid is given under more complicated conditions. The high radiation level of the residual radioactivity does not permit entering the zone of destruction immediately after the explosion and, by the same token, postpones the time of rendering medical first aid. A large number of people have to be covered by dosimetric monitoring, medical processing and deactivation. In the case of mass injuries the need for deactivation can hold up the line of patients receiving medical aid, and the treatment of the patients with radioactive contamination is more complicated and less effective than in the case of radiation injuries produced by external irradiation alone.

Chapter XII

Medical Aid and Nursing Care for War Gas Injuries

In accordance with their action on the living organism war gases are divided into five groups:

I. Neuroparalytic war gases: tabun, sarin, soman and other organic phosphorus war gases [as in the book, war gases will be abbreviated, WG].

II. General toxic WG: hydrocyanic acid and other cyanides, carbon monoxide.

III. Vesicant WG (Skin-Resorptive): mustard gas, nitrogen mustard, lewisite.

IV. Asphyxiant WG: phosgene, diphosgene.

V. Irritant WG: Adamsite and other aromatic halide arsines, chloroacetophenone, brombenzylcyanide and a number of other compounds of this type.

Neuroparalytic War Gases

General Information

Of the chemical agents synthesized abroad during the Second World War and recently organic phosphorus compounds with a convulsive-paralytic action, suggested as war gases, deserve special attention. Their toxic effect is conditioned by their inhibition or block of certain enzyme systems which play an important part in the processes of normal activity of the organism as well as by a direct effect on the cholinergic elements of the nervous system.

Organic phosphorus compounds (alkylfluorophosphates) were first obtained by the German chemist Lange in 1932. Some of them were tested and are being used as drugs (phosphacol [diethyl p-nitrophenyl phosphate], Armin [ethyl-p-nitrophenyl ester of ethylphosphinic acid] and others). Subsequently, the German chemist Schrader proposed that these compounds be used as insecticides--for destroying harmful insects. The most effective of them (thiophos [parathion], octamethyl pyrophosphoramide, systox [demeton] and a number of others) were used in agriculture, whereby their toxicity was so great that despite the introduction of special rules of safety technique, cases of injury to agricultural workers were observed from work with them.

Germany prepared to use the organic phosphorus compounds as war gases (which at that time were called "trylons") before the Second World War.

Distinguished by high toxicity, which surpasses that of all previously known WG, the organic phosphorus war gases--tabun, sarin and soman--have attracted attention also because they penetrate into the living organism at any point of contact. Therefore, aside from intoxication by inhalation war gas injury is possible through the skin, particularly when it is injured, even slightly, or through a burn surface; with the use of contaminated food and water intoxication

is also possible through the gastrointestinal tract. The need for protecting not only the respiratory organs but also the skin to a considerable degree complicates the prophylaxis of injury and elimination of the consequences of the attack.

Tabun, sarin and soman are liquids (they can be used also in the form of viscid compositions, which increases their permanence). Tabun is colorless, but the technical product is of a brownish-red color, has the faint odor of bitter almonds. (It should be kept in mind that under conditions of a chemical focus the determination of a WG by its smell is inadmissible, because inhalation of it, even brief, may have painful consequences). Sarin and soman in the pure form are also colorless, but the technical fluids are dark. Both WG are soluble in water and organic solvents. Sarin is odorless; soman has a distinctive odor, somewhat resembling camphor.

Organic phosphorus war gas vapors are heavier than air. Possible means of using them in the rear are aircraft bombs, aircraft spray tanks (on airplanes other than jets) as well as long-range rockets and jet projectiles; at the front, in addition, artillery shells, gas bombs and chemical shells.

Clinical Picture of Injury

The initial signs of intoxication, which appear shortly after the effect of organic phosphorus poisons regardless of their route of entry into the body, are the following: a feeling of pressure in the chest, labored respiration in inspiration ("breathing as if through a gas mask") and later also in expiration, and the appearance of retrosternal pain. Then there is an increase in asphyxial attacks. Soon after, headache, dizziness, restlessness, anxiety, excitement, disorder of coordination, general weakness and nausea are added. A characteristic early sign consists of twitching of the eyeballs (nystagmus), "tremor" or muscular so-called fibrillar twitches, particularly in the case of injury through the broken skin.

In inhalation intoxication, as a rule, pupillary constriction--miosis--is observed (Fig. 174), sometimes to the size of the head of a pin; this is accompanied by pain in the orbit and temporary blindness. Salivation, increased perspiration, a copious flow of mucus from the nose, repeated vomiting, intestinal and bladder spasm and suddenly a liquid stool occur. The headache becomes exceedingly severe; restlessness, a feeling of anxiety occur and meaningless movements appear; the patient is confused. Simultaneously, a cyanotic hue is observed in the lips, nails, and the face becomes pale, the pulse becomes slower, the blood pressure rises, squeezing pains in the cardiac region are possible; in the case of severe injury the blood pressure drops, which is a poor prognostic sign. Subsequently, the respiration becomes noisy, interrupted and irregular. Against the background of tremor and muscle twitching suddenly convulsions occur; on subsiding these give way temporarily to marked weakness, but then are repeated with renewed vigor. Consciousness is finally

lost; respiration becomes superficial and stops. The heart stops several minutes later. Fibrillar twitchings not uncommonly continue even after death.



Fig. 174. Miosis from Injury with Organic Phosphorus War Gas.

Treatment of Injuries from Organic Phosphorus War Gases

In rendering first aid, which must be extremely prompt, it is essential, first of all, to stop the further intake of WG, putting a gas mask on the victim, removing him from the contaminated zone and neutralization of the organic phosphorus WG where they have come into contact with the skin or clothing. Partial sanitary processing with the special degasifier contained in the individual gas casualty first aid kit or in the bag of antichemical agents in accordance with the instructions included in it serves this purpose. If there is no special degasifier available, the processing can be carried out by means of repeated wiping of the contaminated section of skin or clothing with ammonium hydroxide, half diluted. Thereby, smearing should be avoided.

On coming out of the chemical focus of destruction contaminated clothes should be removed. Only after this is it permissible to remove the gas mask from the injured person. On arrival at the washing facilities station (OP) or at the bath and degassing unit (ODO) of the first aid detachment, the slightly injured and those with injuries of moderate severity are given complete medical processing when they are sent to the receiving and sorting unit or the evacuation hospital unit. As far as the severely injured are concerned, as well as those who have wounds at the same time which need a physician's attention, they are processed with special degasifiers directly at the receiving and sorting unit.

Subsequently, a general antidote is used and symptomatic treatment given.

It is recommended that atropine sulfate be used as an antidote for organic phosphorus WG injuries. There are also stronger special

antidotes which are used according to instructions. Their use should be prompt, of first importance, but substantiated. By and large, atropine is recommended.

The basic measures for controlling hypoxia are supplying the body with oxygen and, in case of disorder of the respiratory pattern, carbogen therapy (95 percent oxygen and five percent carbon dioxide) and artificial respiration.

Nurses should master not only the various methods of artificial respiration but also the use of the appropriate apparatus for artificial respiration and oxygen therapy.

In the case of injury with WG of the sarin-soman type, cardiovascular drugs should be used, in addition to controlling hypoxia and restoring the respiration to normal, but they are effective only after an antidote has been given. In the presence of excitation barbiturates (luminal, evipan) are indicated.

Even in mild cases of intoxication, but particularly in cases of moderate severity and severe intoxication, attentive nursing care and prolonged observation by a physician should be assured. Rest is of particular importance, because noise and other external stimuli can cause recurrences of convulsions.

Oxygen Apparatus

The standard transport oxygen tanks of 40-liter capacity contain oxygen under a pressure of 150 atmospheres, which amounts to 6000 liters of pure oxygen. The shut-off valve, which is in the upper part of the tank, is opened with a gas wrench. From the readings of the manometer marked "Oxygen" on the tank the amount of oxygen in the tank can be determined. (Example. The capacity of the tank is 40 liters. The initial pressure of oxygen in the tank is 140 atmospheres. Therefore, the original oxygen supply $40 \text{ liters} \times 140 = 5600 \text{ liters}$. If the residual pressure is 50 atmospheres the quantity of oxygen remaining in the tank is equal to $40 \text{ liters} \times 50 = 2000 \text{ liters}$).

In some apparatuses the manometer is replaced by a special gauge (finimeter) which shows in liters the supply of oxygen remaining in the tank.

For the purpose of providing a measured feed of oxygen there is a liter gauge (flowmeter) in the reducer which shows the volumetric flow rate of oxygen per minute (Fig. 175).

In handling oxygen tanks and apparatuses the following rules should be observed in order to avoid an explosion: the apparatuses and tanks should not be subjected to vigorous shocks; oxygen apparatuses and tanks should not be kept next to heating apparatuses or in the sun; the oxygen apparatuses should not be smeared with fat or oil, because the oil in combination with oxygen can lead to an explosion. In administering oxygen one should be careful of fire and should not smoke. In changing tanks a gag should always be applied in order to avoid contamination. In opening tanks containing oxygen the shut-off valve should be turned slowly as far as it will go. In order to avoid accidents the oxygen tanks should be under the super-

vision of the motlonadzor [boiler inspection] in peacetime and of the engineer service during war.

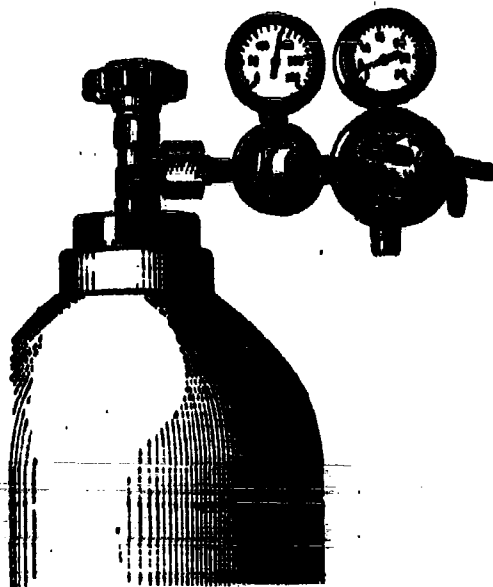


Fig. 175. Oxygen Reducer.

Friction surfaces of the oxygen apparatuses and tanks may be lubricated only with 30 percent aqueous glycerin solution.

Direct connection of the breathing mask to the oxygen tank valve is not permitted because of the danger of high-pressure oxygen feed.

Rubber Oxygen Pillow. The simplest but poorest oxygen apparatus used in therapeutic institutions is the rubber oxygen pillow, which contains 20-40 liters of oxygen. This oxygen supply is used up in 5-10 minutes, which is its main defect. In addition, oxygen feed through the standard ebonite funnel is not very effective, because a leakage of it occurs into the surrounding atmosphere. The use of breathing masks of the oronasal type (Fig. 176) or nasal catheters (Fig. 177) is incomparably more productive. The pillows are filled with oxygen from transport tanks through a reducer, which reduces the oxygen pressure so that the pillow does not rupture during filling.

KI-3M Oxygen Inhaler. More practical and, in addition, suitable for use outside the hospital is the portable KI-3M oxygen inhaler weighing 5.7 kilograms. The schema of the apparatus is shown in Fig. 178. The KI-3M consists of a steel tank containing 195 liters of oxygen, which is fed through a reducer for reducing the oxygen pressure. By means of an injector the addition

of atmospheric air to the oxygen is possible. (If the oxygen inhalation occurs outside a contaminated zone). The breathing system consists of a four-liter bag and two masks. The apparatus is kept in a canvas bag. By means of it oxygen can be administered to two injured persons at the same time.



FIG. 176. Oxygen Inhalation through Breathing Masks of the Oxonasal Type (a and b).

- In using the apparatus in a non-contaminated zone one should:
- a) take the breathing bag and masks with corrugated hoses out of the bag;
 - b) attach the corrugated hoses to the four-way union (if they have been removed);
 - c) open the shut-off valve of the tank completely (as far as it will go) with the reducer closed;
 - d) open the gag of the safety valve;
 - e) establish the necessary oxygen feed (3, 10 or 15 liters per minute) by rotation of the reducer head clockwise;
 - f) establish the necessary air intake by clockwise rotation of the injector disk. The readings on the disk, 10, 20, 30 and 40,

indicate the percentage of air taken in;
g) put the mask on the patient, attaching it to the face. The breathing bag should be filled with oxygen or with the air-oxygen mixture being administered before putting on the mask, for the purpose of accelerating which the corrugated hose is pinched off.



Fig. 177. Oxygen Inhalation through Nasal Catheters.



Fig. 178. KI-3M Oxygen Inhaler.

After using the apparatus the mask is taken off the patient, the shut-off valve is closed, the reducer head and injector disk are returned to the original position, the safety valve is closed with a gag, and the mask is wiped dry.



Fig. 179. I-2 Portable Oxygen Inhaler.

In a contaminated medium the patient is given oxygen only, for which purpose the injector and safety valve should be closed. The corrugated hose with the face piece of the gas mask is attached to the four-way union of the breathing bag in place of the inhaler mask.

I-2 Portable Oxygen Inhaler. In the OPM (first aid detachment) and other therapeutic installations the I-2 portable oxygen inhaler is used (Fig. 179). It is housed in a wooden box and weighs 16 kg. The oxygen supply in it is 800 liters. Oxygen comes in only during inspiration; during expiration its feed stops. The I-2 apparatus, like the KI-3 inhaler, can supply a mixture of air and oxygen, but it is suitable also for operating on pure oxygen in a contaminated zone.

When the inhaler is used in a non-contaminated environment the following are necessary:

a) the stoppers are taken off the connecting box, and corrugated hoses are set on its outlets; b) the humidifier is taken out and, after moistening it with water, it is put back in place; c) the shut-off valve is opened by slowly turning its knob counterclockwise; d) the mask is put on the patient, attaching it to the head with a tie band; oxygen administration will take place automatically; e) for feeding the air-oxygen mixture the air intake head is turned to the left as far as it will go; f) for the purpose of turning on the continuous oxygen feed the adjusting head of the continuous oxygen feed should be turned clockwise.

After using the apparatus the mask is removed, the shut-off valve of the tank is covered and the mask is wiped dry.

For the purpose of administering oxygen in a contaminated atmosphere the masks of the inhaler should be replaced by face-pieces from respirators, and the air feed should be shut off.

In all cases in which I-2 inhalers are used it is necessary to watch the manometer readings. As soon as the oxygen pressure drops to 30 kg/cm² the tank should be replaced by another. The quantity of oxygen in the tank is judged by multiplying the manometer readings by the tank capacity.

IP-1 (Fig. 180) Portable Oxygen-Carbogen Inhaler. This supplies oxygen, air-oxygen mixtures and carbogen (oxygen to which carbon dioxide has been added). It contains 400 liters of oxygen and 250 liters of carbon dioxide, which is added to the oxygen in a quantity of three-five percent, when it is necessary to stimulate the respiratory center, according to the following scheme:

Скорость подачи кислорода в л/мин	2. Содержание углекислоты в смеси		
	2%	3%	5%
1. Скорость подачи кислорода в л/мин	3. Давление на углекислотном редукторе в кгс/см ²		
6	0,2	0,4	0,5
8	0,3	0,5	1,0
10	0,4	0,85	1,5
12	0,45	1,25	2,1
14	0,5	1,5	2,5
16	0,85	1,8	3,0

1. Rate of oxygen feed in liters/min.; 2. CO₂ content in mixture; 3. Pressure at CO₂ reducer, atmospheres.

The IP-1 oxygen-carbogen inhaler is suited to use in a contaminated zone. In this case the oxygen concentration regulator is set in the "100%" position; the atmospheric air suction valve is closed, and a respirator face-piece is attached in place of the mask.

Oxygen Inhalation Station. Under OPM conditions and conditions of other therapeutic installations of the GO [civil defense] medical service the oxygen inhalation station (KIS) may be used. This is a portable apparatus housed in a packing box. By means of the KIS oxygen can be administered simultaneously to seven injured persons (Fig. 181).

Two reducers are mounted on its distributing panel: oxygen and carbon dioxide. Oxygen and carbon dioxide tanks, respectively, are attached to them. The oxygen tanks are attached in pairs by means of brass tubes of a light blue color. The carbon dioxide tank is attached by means of a black tube. The pressure in the tanks is

determined by appropriate high pressure manometers. The working pressure in the oxygen and in the carbon dioxide reducers is set at a level of 6 kg/cm² according to respective low pressure manometers.

The working pressure is regulated by turning knobs on the reducers. The reducers are furnished with safety valves, which automatically open and release gas into the atmosphere when the working pressure in the reducers rises to 8-10 kg/cm².

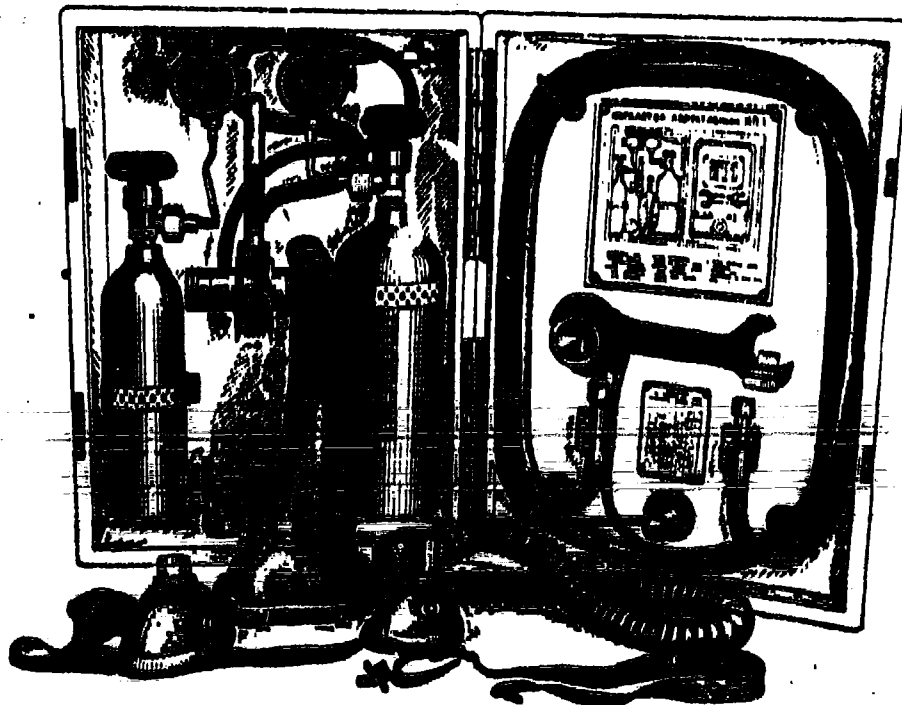


Fig. 180. Portable IP-1 Oxygen-Carbogen Inhaler.

The oxygen and carbon dioxide from reducers go to the individual inhalers through rubber tubes.

Oxygen Tent. In specialized hospitals of the suburban region it is recommended that oxygen tents (chambers) be used for oxygen administration. In the use of the oxygen tent the injured person's head is placed under a canopy of waterproof fabric. This makes it possible to create the necessary oxygen concentration in the injured person's breathing area. His breathing is not at all hampered under these conditions.

The improved oxygen tent (constructed by the Ukrainian Medical Equipment Plant) (Fig. 182) is designed for the treatment of the injured with the use of oxygen-air mixtures containing 40-60 percent oxygen under infirm conditions also. It consists of a ventilation apparatus and a waterproof canopy. The ventilation apparatus includes

an electric motor with an air blower as well as a regenerator (conditioner) for cooling and purifying the air. The tent canopy is stretched out on a metal rod coming from the ventilation apparatus. In the working position the space under the canopy amounts to about 0.5 cubic meter. There are windows of transparent material in the canopy for observation of the patients and slots closed by hooks which are used for giving care to the patient (giving drugs, food, etc.) without stopping the operation of the tent. The whole tent is set up on a movable chassis, which permits moving it and bringing it up to the patient's bedside easily. The weight of the tent without the oxygen tank is 61.5 kg.



Fig. 181. Oxygen Inhalation Station (KIS).

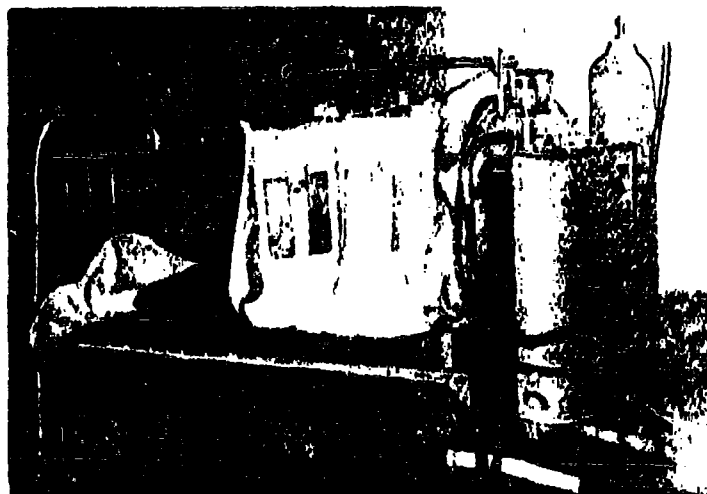


Fig. 182. Improved Oxygen Tent.

Artificial Respiration Apparatus

In the event of a marked weakening or stoppage of respiration there is no point in oxygen therapy until the respiratory movements are restored.

Handy methods of artificial respiration are not always effective for ~~W~~ injury, for example, in the case of ~~W~~ injury with gases of the sarin-soman type, where the leading factor in the occurrence of asphyxia is first bronchospasm and subsequently, the paralytic state of the respiratory muscles. In addition, good technique is needed for the successful restoration of respiration. At the same time, the mass nature of the attack and the rapid fatigability of the personnel of the non-military units who give the artificial respiration (mainly women) is a serious obstacle under civil defense conditions.

Therefore, the use of appropriate apparatus, which operates on the principle of forcing air or oxygen actively into the lungs with subsequent aspiration of it, acquires special importance in its performance.

Gornospasatel'-3. [Mine-Rescuer]. Quite popular in the experience of the mining industry is the "Gornospasatel'-3" (GS-3) (Fig. 183) artificial respiration apparatus.

The weight of the apparatus together with the tank and duralumin case is 7 kg. The apparatus is designed mainly for giving artificial respiration while on the move, during the manual evacuation of the injured persons from the focus of destruction. With recovery of respiration it may be used as an oxygen inhaler. The apparatus is turned on by opening the shut-off valve of the tank; conversion to inhalation is accomplished by screwing off the cover of the breathing mask.

DP-2 Artificial Respiration Apparatus (Fig. 184). Aside from forcing air into the lungs and aspirating it, this apparatus can be used simultaneously as an oxygen inhaler and as an aspirator for suctioning mucus out of the respiratory tract. It operates on a small-capacity tank or air compressor, but it is not suitable in a contaminated area, because a 45-percent air-oxygen mixture is forced through it and, therefore, mixture with atmospheric air occurs.

"Gornospasatel'-4" (GS-4) Artificial Respiration Apparatus (Fig. 185). This is a hospital apparatus with two oxygen tanks of 12-liter capacity each, mounted on a cart. The apparatus makes it possible to perform artificial respiration by two methods: by the method of blowing oxygen into the lungs and by means of an external effect on the chest. It operates like an oxygen inhaler with administration of oxygen or air-oxygen mixtures and also works as an aspirator. Provision is made for humidification of the oxygen.

If the oxygen supply in the tanks has been used up or if it is undesirable that it be used up the apparatus can operate from an air compressor set up on it which is operated, in turn, by an electric motor using current from the lighting system.

When the artificial respiration is performed with the apparatus used as an external chest press it is possible to create high pressure

--up to 120 mm of Hg--in the chest. Because of this, effective pulmonary ventilation occurs, which contributes to the recovery of respiration. The control panel is conveniently mounted on the top of a pedestal.

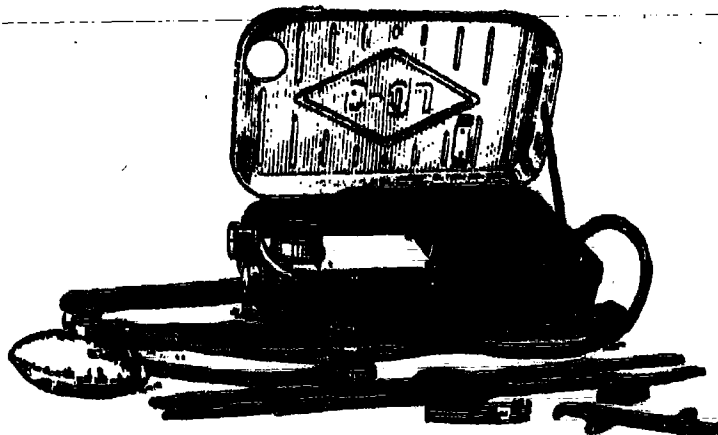


Fig. 183. "Gornospasatel'-3" (GS-3) Artificial Respiration Apparatus.

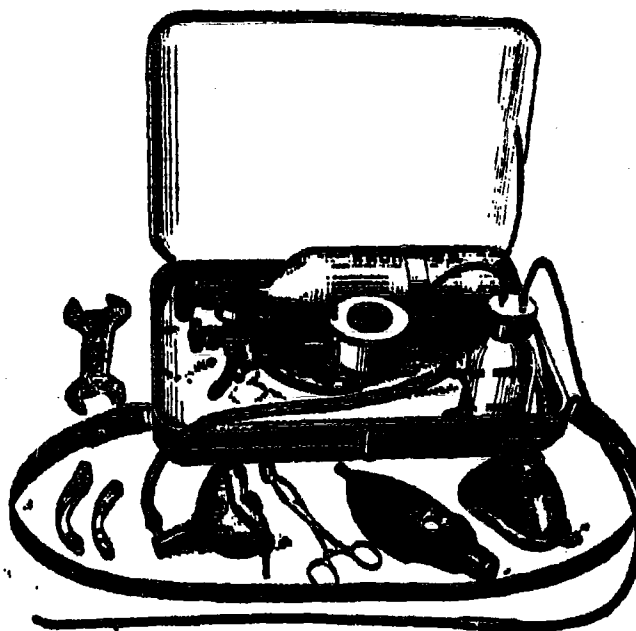


Fig. 184. DP-2 Portable Artificial Respiration Apparatus.

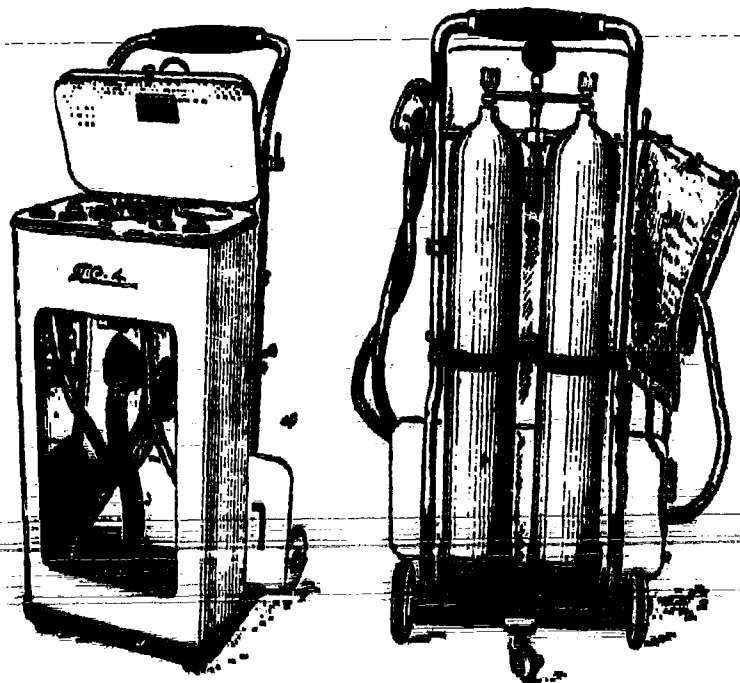


Fig. 105. "Gornospasatel" (GS-4) Artificial Respiration Apparatus.

Portable Hand-Operated Apparatus. Under field circumstances portable hand-operated apparatus, the RPA-1 weighing 3.6 kg (Fig. 106) and the RPA-2 weighing 4.5 kg (Fig. 107) may be used; these force in atmospheric air by means of a hand-operated bellows, because of which these apparatuses are applicable in a contaminated area only if they are attached to a gas mask canister. Air is forced in by means of the bellows and provides for inspiration. Expiration is accomplished passively, because of the elasticity of the lungs.

General Toxic War Gases

Hydrocyanic Acid and Other Cyanides

General Information

Hydrocyanic acid is a colorless volatile fluid with a sharp hot taste and the odor of bitter almonds. Its boiling point is $+26.5^{\circ}$; freezing point, -14.2° . Hydrocyanic acid is lighter than air; its —

vapor density is 0.93 that of air. In the pure form it volatilizes quickly and is not well suited for military purposes; therefore, appropriate stabilizers (weighting material) need to be added when it is used as a WG.

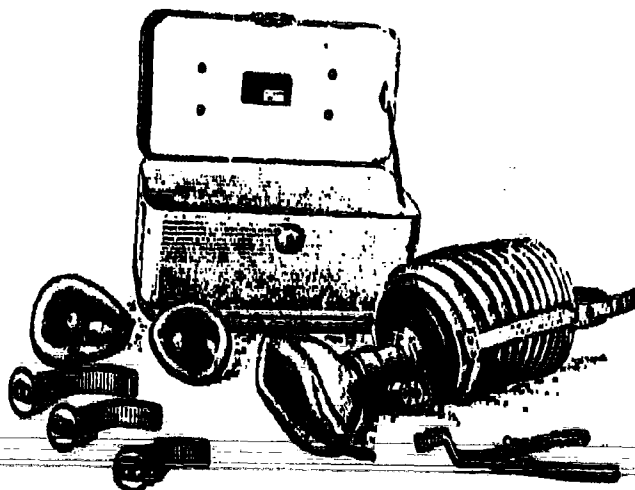


Fig. 186. RPA-1 Portable Hand-Operated Artificial Respiration Apparatus.

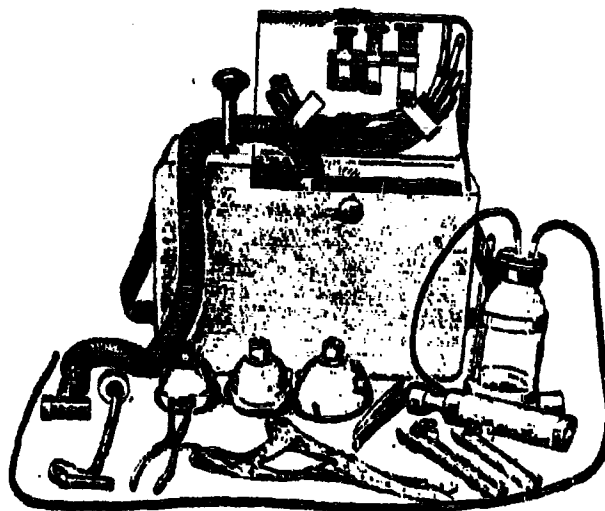


Fig. 187. RPA-2 Portable Hand-Operated Artificial Respiration Apparatus.

Hydrocyanic acid penetrates into the living organism; in the form of vapors, through the respiratory organs, and only when the vapors are present in high concentration in the air or when it is in the liquid-droplet state does it go through the intact skin. The inhalational route of injury by cyanides is the main one under combat circumstances, if not of sole significance.

Intoxication with hydrocyanic acid salts--potassium or sodium cyanide--is also possible by taking contaminated water or food; intoxication can occur from cyanide derivatives also, for example, cyanogen chloride, which is used in peace time for destroying scudlike in the fields.

Clinical Picture of Injury

A characteristic feature of the effect of cyanides on the body is the almost complete absence of a local effect. Producing a slight stimulation on inhalation, the HCN penetrates through the respiratory organs without injuring them, into the blood stream, where it circulates without reacting with the blood. The cyanides interfere with the normal course of the oxidation-reduction processes directly in the body tissues as the result of a block of respiratory enzymes. Oxygen absorption by the tissues is reduced, and "arterialization" of the blood occurs. Thereby, the blood in the veins acquires a bright pink color because of its excessive oxygen content. The central nervous system is most sensitive to hypoxia; this entails interference with the operation of the vital centers. The initial stimulation and subsequent paralysis of these centers lead to a lethal outcome. The "fulminant" form of death occurs in several minutes; the delayed form takes longer. In the latter case four stages of intoxication can be distinguished:

First Stage--the stage of precursors: the odor of bitter almonds, a bitter taste, scratching in the throat, reddening of the eyes, dizziness, salivation and nausea.

Second Stage--the asthmatic: a picture somewhat resembling an attack of angina pectoris occurs--squeezing pain in the cardiac region, *angor animi*, dyspnea, fast pulse, marked muscle weakness.

Third Stage--convulsive: loss of consciousness and convulsions; contraction of the back muscles (*opisthotonus*), gritting of the teeth and bulging of the eyes are particularly marked.

Fourth Stage--paralytic: the convulsions subside; only muscle twitchings remain; the reflexes disappear, involuntary passage of stool and urine occurs; dyspnea is replaced by irregular respiration with pauses, which increase progressively; the blood pressure drops; respiratory arrest occurs while the heart is still beating. However, in this case there is hope of saving the patient with vigorous medical intervention.

In various cases of intoxication death occurs later, sometimes even after several hours, which may be brought about by the functional condition of the organism.

In the case of injury with cyanogen halides (cyanogen chloride)

a severe painful irritation of the eyes and respiratory tract occurs in addition. Cyanogen chloride is particularly dangerous, owing to the fact that with increased humidity of the air the ordinary gas mask is not reliable protection against it.

Treatment of Injuries

Therapy with antidotes is given in the following way for injury by hydrocyanic acid and other cyanides. First of all, amyl nitrite inhalation is prescribed. Then, as an antidote, methylene blue is used which intensifies the anaerobic oxidative processes in the tissues, being a kind of hydrogen acceptor. Methylene blue is part of the drug chromosmone, which is injected intravenously in a quantity of 30 cc. A second chromosmone injection in the case of recurrence of convulsions is permissible only in half the dose.

For the purpose of direct binding of the hydrocyanic acid sodium hyposulfite is suggested as an antidote; this is given intravenously in the form of the 30 percent solution in a quantity of 20-30 cc. By splitting off sulfur it converts cyanides into the slightly toxic thiocyanides.

In addition, extensive use should be made of symptomatic therapy, but this gives a good result only after the use of antidotes. Thus, in the case of respiratory arrest artificial respiration is indicated--by hand (Figs. 188 and 189) and by apparatus--the intravenous injection of cytolone, lobeline, inhalation of oxygen and carbogen. For cardiac weakness fast-acting cardiac agents are prescribed.

Carbon Monoxide

General Information

Carbon monoxide is a colorless gas, lighter than air. In the pure form it possesses neither odor nor color nor taste; therefore, it cannot be determined in air organoleptically. In water it is practically insoluble and does not combine with the water. The ordinary civilian gas mask keeps it out only if a special cartridge containing hopealite is used in it.

Carbon monoxide cannot be used as a WG, because, being lighter than air, it is very volatile. Danger of injury from it under combat conditions occurs in large-scale fires, particularly those caused by napalm or an atomic (or hydrogen) bomb explosion. Under such conditions, the absence of atmospheric oxygen in the fire area is of special importance.

Clinical Picture of Injury

Carbon monoxide penetrates into the body through the respiratory organs, without irritating or injuring the mucosae, and diffuses

quickly into the blood. Here the carbon monoxide reacts with hemoglobin, taking the place of oxygen in it and forming carboxyhemoglobin and producing hypoxia. The blood oxygen deficiency is responsible for the picture of injury.

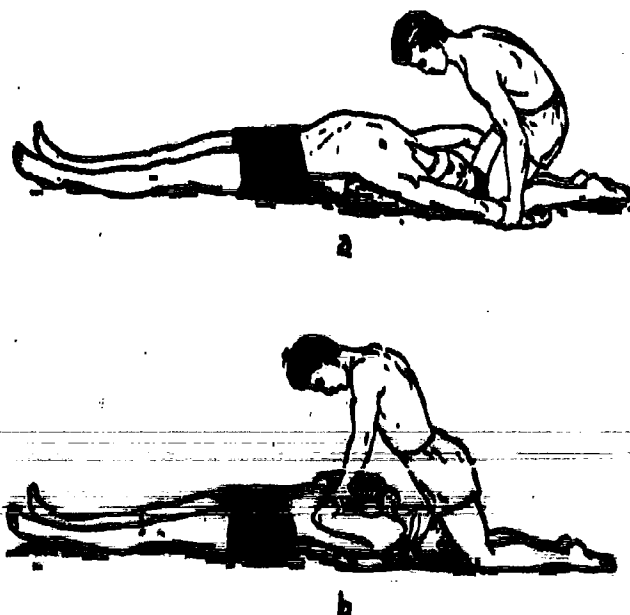


Fig. 188. Artificial Respiration by the Silvester Method (a and b).

The degree of expression of the clinical signs of intoxication depends on the quantity of carboxyhemoglobin in the blood and increases gradually. The early signs are weakness and tiredness; shortly after, headache, dizziness, heating at the temples, nausea, and sometimes vomiting are added. The face becomes red; excitation is observed and sometimes euphoria; there is muscle weakness, loss of consciousness and sometimes convulsions. A fatal outcome can occur against the background of a paralytic state with disappearance of reflexes, involuntary defecation and urination, respiratory and, later, cardiac arrest.

With a high carbon monoxide concentration (in combat, in the case of an industrial accident) cases of sudden death have been observed with signs of respiratory arrest from the direct effect of carbon monoxide on vital centers.

In cases of severe intoxications which end in recovery and sometimes in cases of moderate severity those affected remain in a state of depression for several hours or even days. Headaches,

disinness and sometimes loss of memory are observed. Unique skin lesions of a trophic nature in the form of blisters filled with a serous fluid, sometimes bed-sores, punctate hemorrhages, ecchymoses and others may be noted as complications. Psychosis, paralysis, paresis, muscle-weakness are also observed. In various cases pneumonia develops.

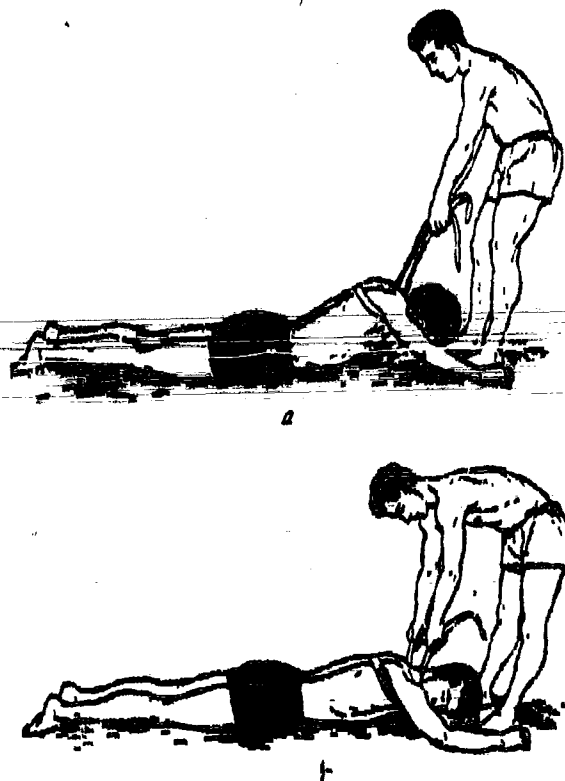


Fig. 189. Artificial Respiration by the Kallistov Method (a and b)

Treatment of the Injury

In rendering medical aid to those injured by carbon monoxide it should be taken into consideration that carboxyhemoglobin is a reversible compound, and with increase in the partial pressure of oxygen in the blood, the latter, displacing carbon monoxide, takes

its own place, forming oxyhemoglobin and thereby restoring the tissue oxygen supply. Therefore, the main measures for carbon monoxide removal are: restoration of respiration, oxygen therapy and warming the patients. With the aim of restoring the respiration cytitone, lobeline and artificial respiration are used (manual and mechanical methods for the latter). Cytitone is a respiratory stimulant containing cyttisine and Thermopsis lanceolata. In this case, artificial respiration is not only of symptomatic significance; by restoring the pulmonary ventilation it contributes directly to excretion of the poison. Carbogen therapy for carbon monoxide poisoning is more effective than oxygen therapy, because the addition of carbon dioxide to oxygen during inhalation leads to stimulation of the respiratory center and a deepening of respiration, which contributes to greater oxygen absorption and the most rapid liberation of the carbon monoxide from the blood, increase in the tissue capacity of blood oxygen utilization, increase in the vascular tone and elimination of the acute circulatory insufficiency.

In the case of a persistent unconscious state it is advisable to bleed the patient (200-300 cc), if the pulse is of good quality, and then inject physiological saline solution intramuscularly or hypertonic glucose solution intravenously and cardiac agents as indicated.

Considering the possibility of late complications, further observation by a physician is necessary, particularly by a neuropathologist.

Resistant (Skin-Absorptive) War Gases

The representatives of this group are: mustards--mustard gas and nitrogen mustard--and lewisite.

The group of skin-absorptive war gases includes persistent ones which penetrate into the living body at any point of contact: through the skin and mucous membranes of the respiratory tract, eyes, digestive tract. The injurious effect is manifested when they are used in the vapor, mist, liquid-droplet or viscous states as well as after contact with contaminated objects.

At the places of direct contact with the poison neurodegenerative tissue changes occur. The local injury is expressed clinically in an inflammatory process of necrotic nature. As far as the absorption effect is concerned (a general effect on the body), it is expressed particularly quickly in the case of combined injuries--in the presence of wounds, burns, or radiation sickness. The picture of general intoxication is made up of two components: the effect of absorption of the gas directly and the effect of the protein tissue-breakdown products. Lewisite poisoning is much different from mustard poisoning.

Lewisite--an enzymatic toxin. On being poisoned with it, inhibition of the vital nerve centers occurs quickly because of brain tissue anoxia: there results cardiac insufficiency, severe and painful changes at sites of direct contact with the gas--inflammatory and subsequent necrotic lesions of the skin, respiratory organs, eyes and respiration.

A characteristic feature of the WG of this group is the latent period--from two to 24 hours (in rare cases, longer)--in the case of mustard gas poisoning and from several minutes to one or two hours in the case of lewisite poisoning.

The local skin effect of WG of the mustard gas type when used in the vapor form is most pronounced in places with a thin moist skin (the inguinal region and genital organs, popliteal, interdigital and other areas). Liquid-droplet WG affect the skin at places where they fall on it or at places of contact with objects contaminated with WG. Ordinary clothing is poor protection against WG of the mustard type, because it adsorbs and accumulates WG vapors, while WG droplets penetrate through the clothes to the skin in the first few minutes. WG penetrate more slowly through many layers of clothing. A gas mask, protective suit, rubber boots and gloves afford reliable protection. A filtering protective suit protects only against WG vapors.

Mustard Gas

General Information

Mustard gas--dichloroethylsulfide--is an oily fluid. The chemically pure product is colorless; the technical product is of a chestnut-brown color. The fusion point of the chemically pure mustard gas is $+14^{\circ}$; the boiling point, $+217^{\circ}$. Its odor is somewhat like horse radish or mustard, but it can be disguised on purpose by fragrant admixtures. It is poorly soluble in water and is slowly hydrolyzed, losing its toxicity. It is readily soluble in organic solvents--kerosene, gasoline, fats, lipoids present in animal cells but maintains its toxicity. Chlorination of mustard gas with chloride of lime, mono- or dichloramine completely neutralizes it.

Clinical Picture of Intoxication

Mustard-gas-produced skin lesions go through a number of phases in their development. Contact of the poison with the skin does not immediately produce any subjective sensations. Only later, usually in the case of injury by WG vapors, does itching occur.

The first stage of injury is a bright pink erythema (reddening of the skin) which later darkens. After the effect of vapors (Fig. 190) it is of a diffuse nature, and subsequently diffuse skin edema is observed. After contact with droplets of the WG the area of erythema is limited to the place of contact, but edema extends further.

By the end of the first or beginning of the second day the second stage--exudative--develops. In the case of injury by vapors vesicles (blisters) occur in the form of chains, necklaces and half-rings which subsequently become confluent. After contact with droplets of the WG or in the case of contact with contaminated

surfaces the injury may take on a bullous character--large vesicles appear (Fig. 191). The bullae and vesicles are filled with a yellowish serous fluid. On the first day, the blister contents are transparent, then they become turbid, assuming a jelly-like appearance. The blister fluid does not contain mustard gas. In mild cases of injury the blister contents are resorbed, and a scab forms. After the scab falls off a permanent pigmented spot remains.

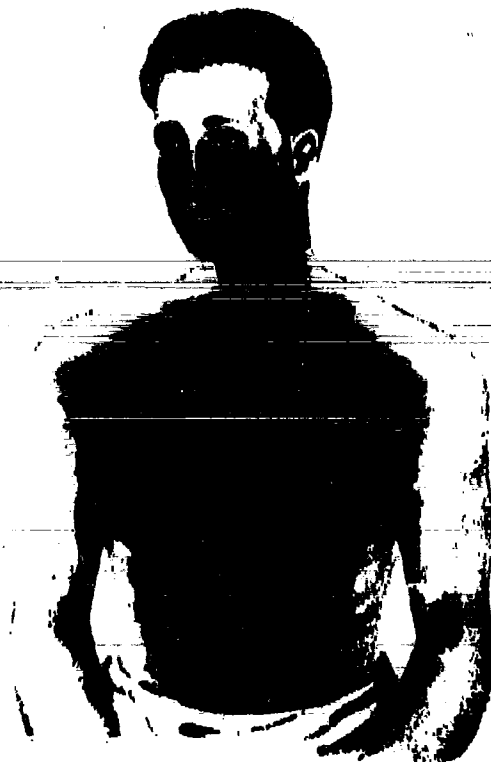


Fig. 190. Extensive Skin Lesions from Mustard Gas Vapor.

In the event of considerable contact with the WG and the absence of at least partial processing as well as in the case of rupture of the wall of the bulla and contamination of excoriated surface the process assumes an inflammatory-necrotic character. A thick friable eschar forms, which, on falling off, exposes an ulcerated surface. Thereby, the boundaries of the area, rimmed

by dull pale margins, continues to expand. Healing takes a long time (one to three months). As a result, superficial depigmented scars with permanent pigmentation around them remain.

Fig. 191. Extensive Lesion from Liquid Mustard Gas--Deep Bullous Form.

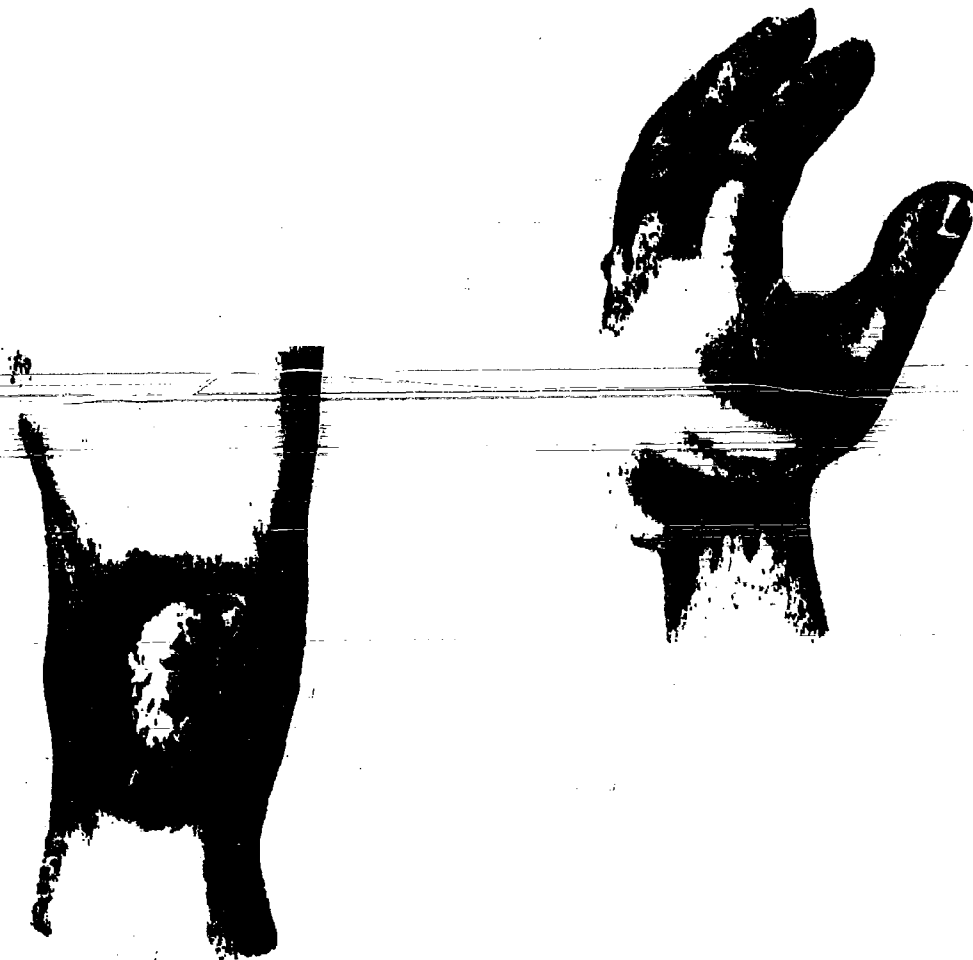


Fig. 192. Skin Lesion from Liquid Mustard Gas in Knee Joint Area after a Day in the Ulcer Stage (Deep Bullous Form).

There are certain characteristics of the course of the injury depending on the localization of the lesion. Thus, on the skin of the face diffuse hyperemia is associated with edema of the skin and a puffy face because of the presence of areolar subcutaneous tissue there. The lesion is frequently limited to a finely vesicular eruption.

Genital lesions have a particularly severe and painful course. The lesions can develop even without direct contact of mustard gas with the genital organs (for example, in the case of injury to the thighs).

On the lower extremities large bullae are transformed into slowly healing ulcers (Fig. 192).

Injury to Visual Organs. Two to four hours after the effect of MG vapors and in the event liquid-droplet MG enters the eyes the sensation of a foreign body (sand) in the eye, photophobia, orbital pain, blepharospasm, slight lacrimation and then suppuration, reddening of the eyeball, edema of the lids and subsequently ulceration of them occur. Of these, the initial signs occur in the first few minutes. Soaring, which occurs later, can deform the lids. In severe cases keratitis is possible as a complication (inflammation of the cornea); a cataract can also form.

Injury to Respiratory Organs. The respiratory organs are involved in a descending order in the event of injury by inhalation. The first signs of injury appear two to five hours after inhalation of the MG and come out as a painful coryza, a dry, troublesome cough, aphonia, hyperemia and edema of the upper respiratory tract.

After the inhalation of MG in the mist state and in the event of a considerable concentration of it in the air or prolonged stay in the region without a gas mask, the lung tissue may be involved in the process. In this case the sputum assumes a mucopurulent character. In it there are films consisting of sloughed-off epithelium and fibrin. Respiratory obstruction from such films can bring about a fatal outcome in various cases. In connection with the frequent superimposition of infection, the bronchopneumonia which occurs has a severe course, is complicated by pulmonary abscesses and gangrene and not uncommonly ends fatally. In the case of mustard gas injury produced by the mist form of the gas the occurrence of toxic pulmonary edema may be expected.

Involvement of the Gastrointestinal Tract. The gastrointestinal tract is affected by taking food or water contaminated with mustard gas but can also be involved in the process as the result of the general effect of the MG. As early as 20-40 minutes after eating contaminated food the first symptoms appear: salivation, nausea, vomiting, epigastric pain, and, later, a liquid tarry stool. Ulcers may form in the esophagus, stomach or intestine. The following changes are found in the mouth also: edema of the lips and a vesicular eruption, reddening and ulceration of the oral mucosa. A fatal outcome depends on the presence of the full-blown intoxication, on the background of convulsions or sleepiness and general weakness.

Nitrogen Mustard

General Information

Nitrogen mustard--trichlorotriethylamine--is a pale yellow fluid, almost odorless. Its boiling point is about $+240^{\circ}$; fusion point, -4° . It is poorly soluble in water; readily soluble in organic solvents. Chloride of lime neutralizes it, but monochloramine, highly effective in the case of mustard gas, does not react with nitrogen mustard and is unsuitable as a degasifier.

Clinical Picture of Injury

In nitrogen mustard intoxication the picture is the same as after the effect of mustard gas, but the general effect, particularly on the nervous system, hematopoietic organs and young growing tissue is more pronounced.

The local signs are less pronounced after the effect of nitrogen mustard, and the latent period of its action is longer.

Lewisite

General Information

Lewisite--chlorovinylidichlorarsine--is an arsenical. The technical product is a brown fluid with a strong, irritating odor of geraniums. Its fusion point is $+0.1^{\circ}$; boiling point, $+120^{\circ}$. On being dissolved in water it hydrolyzes rapidly, forming a toxic compound which contains arsenic. Like all the HG of this group it is soluble in organic solvents.

Lewisite also belongs to the group of skin-resorptive HG . It is much less permanent than the mustards, but its toxicity is 5-10 times greater than that of the mustards. For skin injury the latent period is short--from several minutes to one-two hours; for eye injury, injury to respiratory organs and digestive organs there is practically no latent period.

Lewisite, like the other HG of this group, penetrates into any point of contact, either in the form of vapor or mist or in the liquid-droplet state. Injury with it rapidly causes severe pain, which makes it possible to diagnose it in the first few minutes after contact with it.

Clinical Picture of Injury

In lewisite intoxication the general signs develop quickly: marked depression of the central nervous system, particularly of its vital centers, and acute cardiovascular insufficiency.

Skin Lesions. Five to 40 minutes after contact with a drop of lewisite, rarely later, a pale, sometimes somewhat depressed area appears, surrounded by very bright erythema and massive edema.

Thereby, there is an itching sensation, with intense burning and considerable pain in the area of injury. Shortly after, several swollen small vesicles, which rapidly coalesce into a large bulla, appear on the velvety erythematous surface. The transparent amber-colored blister fluid contains transformation products of lewisite (elemental arsenic). At the end of 24 hours the blister fluid becomes turbid from the admixture of leucocytes and fibrin. Later, the walls of the bulla collapse or are broken, exposing a bright pink surface. In the center of the lesion there are distinct necrotic changes which subsequently are covered by a tight eschar. After contact with large quantities of WG edema may be marked and extend to the underlying subcutaneous tissue. Around the site of the lesion there are punctate hemorrhages. After separation of the eschar a deep necrotic ulcer remains. The condition terminates in scar formation. Infectious complications are observed less often than after mustard gas.

Injury of the skin with lewisite vapors has a milder course than after contact with the liquid WG. Subsequently, all phases of its development and healing occur more rapidly than after injury with mustard gas vapor.

Burning and severe pain at the site of the lesion are characteristic of lewisite in this case also.

~~Injury to the eyes. Immediately after contact with WG vapors by mist, signs of painful irritation and spasm of the lids occur which partly prevent further eye injury. Injury to ocular mucosae is more intense than after mustards.~~

~~Injury to Respiratory Organs. A mild injury may be limited to irritation and hyperemia with edema of the upper respiratory mucosa. With high concentrations of WG in the air a descending process occurs which encompasses the respiratory tract and lungs; pneumonia and pulmonary edema may develop. Pulmonary edema also develops in case of a massive skin injury or when a wound is contaminated with liquid lewisite.~~

Treatment of Intoxication from Vesicant WG

Treatment of intoxication from WG absorption from the skin, as is known from the experience of the First World War, is of a protracted nature.

The existence of broad-spectrum antibiotics and sulfonamides should provide for more successful and quicker treatment. With the aim of treating mustard gas lesions of the skin, antiseptics of the chloramine type and antibiotics (both externally and internally) should be used for preventing infection; the open method of treatment, application of films (coagulation or paraffin), various stimulants, physiotherapeutic agents and surgical methods and others should be applied.

Treatment of Eye Injuries. Copious irrigation of the eyes with boric acid solution or sodium bicarbonate or at least with water from a canteen, if it has been kept hermetically sealed, is indicated.

In the performance of complete medical processing, 0.5 percent aqueous chloramine solution is used with subsequent sodium bicarbonate solution irrigation, after which tetracain solution is instilled into the eyes, if the eyes have not been protected during the time spent in a contaminated zone. Subsequently, symptomatic therapy is given.

In the case of lewisite injury it is necessary to introduce 30-percent unithiol (2,3-dimercaptopropane sodium sulfonate, used in heavy metal poisoning) ointment into the conjunctival sac.

Treatment of Injury to the Respiratory Organs. The throat is rinsed with two percent sodium bicarbonate solution, 0.1-percent potassium permanganate solution, and 0.1-percent monochloramine solution. Treatment for injury to the respiratory organs is only symptomatic: inhalation of sodium bicarbonate solution; codeine and dionin (ethylmorphine) by mouth; subsequently, expectorants as indicated. Antibiotics and sulfonamides are extensively used.

Treatment of Injuries to Digestive Organs. Thirty grams of activated charcoal or carbolen (7% charcoal; the rest is sucrose, starch and NaCl) is given in a half-glass of water, and vomiting is induced or the stomach is irrigated with 1:5000 potassium permanganate solution or 0.5-percent sodium bicarbonate solution (only when done early). Subsequent treatment is according to indications.

Treatment of the General Absorptive Effect. In the presence of signs of cardiac failure ordinary cardiovascular agents are prescribed. In cases of severe injury ephedrine or lobeline, which stimulate the respiratory center, is injected, particularly for lewisite injury. Intravenous infusions of 40-percent glucose solution, 30-percent sodium hyposulfite solution, 10-percent calcium chloride and calcium gluconate are recommended. Copious drinking is indicated.

For increasing anemia vitamin B₁₂ is prescribed. For leukopenia (particularly after nitrogen mustard intoxication) agents are used which stimulate hematopoiesis (vitamin A₅, thosano and others).

With the aim of general tonic therapy, particularly in the stage of regenerative processes, autohemotherapy, blood transfusion and vitamin therapy may be suggested.

Among the specific methods of treatment for lewisite intoxication is the use of unithiol, the specific antidote for arsenic.

Antidote treatment with unithiol is indicated during the first week after lewisite intoxication. There are no specific antidotes for intoxication with the mustards.

Asphyxiant MG

General Information

Phosgene and diphosgene are readily evaporable fluids with the odor of rotten fruit, hay or mold. Phosgene boils at +3.8°; diphosgene, at +127°. In the summer, phosgene has an injurious effect

which lasts for minutes; in the winter, for hours; diphosgene, for three to 10 hours in the summer, and up to 24 hours in the winter.

It should be taken into consideration that with gradually decreasing concentration of a WG of the phosgene type in a focus, even in the presence of an indistinct odor and in the absence of irritation, the gas mask should not be removed, because the picture of intoxication, sometimes severe--up to a lethal outcome--can occur from the effect of WG of the phosgene type as the result of prolonged inhalation of the vapor, even in reduced concentration.

Clinical Picture of Injury

The main characteristic of injury with an asphyxiant WG of the phosgene type is the occurrence of pulmonary edema as the result of passage of the fluid portion of the blood into the alveoli. Pulmonary edema develops with signs of hypoxia with a disorder of water balance in the body from elevation of the blood pressure in the lesser circulation and increased permeability of the alveolar and capillary walls. This accounts for the possibility of passage of the fluid part of the blood from the blood stream into the alveoli, thereby complicating the diffusion of atmospheric oxygen from the alveoli into the blood. Simultaneously, signs of emphysema occur (dilatation of the lungs), which still further complicates the oxygen exchange. As a result, hypoxia occurs in consequence of the pulmonary ventilation disorder, and the "blue" form of asphyxia develops, expressed in cyanosis and dyspnea. Subsequently, hypoxia increases because of cardiovascular insufficiency. As a result, the "gray" form of asphyxia can develop, in which not only the oxygen but also the carbon dioxide content of the blood drops. Respiration becomes irregular, with pauses; there is a drop in the blood pressure; paresis of the respiratory center and death occur.

The characteristic blood changes are: increasing hemoconcentration, increased coagulability and viscosity of the blood; increase in the number of formed elements, change in the gas composition of the blood (decrease in oxygen, increase in carbon dioxide).

In the developmental dynamics of the picture of intoxication with a WG of the phosgene type a certain periodicity is observed in the clinical signs, which is of significance in giving medical aid to the persons involved.

First phase--reflex--is characterized by irritation of the upper respiratory tract from inhalation of the WG , expressed in cough, sometimes nausea, dizziness and general weakness. After leaving the focus the signs disappear in 15-30 minutes, after which comes the second phase--the phase of remission ("sham well-being"), at which time refusal of smoking and the rapid occurrence of signs of cardiac decompensation are observed on physical exercise (cyanosis and dyspnea).

Remission, or the Latent Period, lasts up to two-four hours; less often, up to a day, and changes, sometimes suddenly, into the next, third phase, characterized by signs of pulmonary edema (cough--

with foamy sputum, cyanosis, dyspnea and others), accompanied by hemoconcentration, increased viscosity and coagulability of it, and increasing cardiac weakness. If death does not occur by the end of the first two days the edema may be resorbed, and the process in this case may end in recovery. In a number of cases, particularly when infection is superimposed, the process goes into the fourth phase, inflammatory. Bronchopneumonia and other complications occur.

Treatment of the Injury

There is no antidote therapy; therefore, only symptomatic treatment is used, first in connection with the leading symptoms: control of toxic pulmonary edema, hypoxia and cardiac decompensation.

Therapy of Edema. Even in the early stages of intoxication (in the latent period and at the beginning of pulmonary edema) massive bleeding is indicated--from 300 to 700 cc depending on the weight and general condition of the patient. Bleeding prevents the entrance of the liquid part of the blood into the alveoli by reducing the quantity of blood. By reducing the total mass of circulating blood, bleeding also facilitates the work of the heart. With the gray form of asphyxia bleeding is contraindicated because of the drop in blood pressure.

With the aim of reducing the vascular permeability in the early stages of intoxication, 10-percent calcium gluconate in a quantity of 10 cc is used intravenously.

One of the methods of controlling pulmonary edema is that of increasing the osmotic pressure of the blood by means of the intravenous injection of hypertonic (40-percent) glucose solution in a quantity of 50 cc; in the gray form of asphyxia, when it is important to raise the blood pressure, it is given in quantities up to 100 cc (it should be injected very slowly, heated to 37°).

Control of Cough. For troublesome cough, particularly in the stage of reflex irritation, codeine and dionin are used in ordinary doses. With the development of bronchopneumonia three percent potassium iodide is permissible as an expectorant.

Control of Hypoxia. First, it is essential to assure maximum rest and warm the patient. Then, oxygen therapy--the earliest possible administration of oxygen by means of oxygen inhalers--is indicated.

In the gray form of asphyxia the use of carbogen is indicated (a mixture of 95 percent oxygen and five percent oxygen) with the aim of activation of the work of the respiratory center. In addition, intravenous cytolone injection is recommended.

Control of Cardiovascular Failure. With this aim in view, for the purpose of subcutaneous injections, a number of cardiovascular agents are used (camphor oil, caffeine, coramine and others). Corglycon (preparation containing all *Convallaria majalis*

glycosides/ and strophanthin may be used intravenously.

Therapeutic Measures of a General Nature. Those intoxicated with asphyxiant WG need complete rest, strict bed rest. If a pre-edematous state is present at the end of the latent period luminal may be used for eliminating excitation and restlessness. The patient should be given heat in the form of hot water bags on the extremities. In the blue form of asphyxia drinking should be restricted; in the gray form, drinking is not only permitted but is also encouraged, particularly of five percent glucose solution. The feedings in the edema stage should be frequent but small and light (fruit jelly, liquid gruels, bouillons, vegetable purees, and others). Evacuation is permissible in the supine position only in the stage of the latent period or after resorption of edema. The patients need hospital treatment and prolonged observation by a physician.

Irritant WG

Irritant WG of the Adamsite Type

~~They may be used in the form of smoke. On inhalation they produce painful irritation of the nerve endings in the nasopharynx and upper respiratory tract, sneezing, coughing, toothache, pain in the frontal and orbital sinuses, retrosternal pain, nausea, and sometimes vomiting. In severe cases there may be nervous system signs also; severe headache, depression, loss of memory, spatial disorientation, very transitory paresis and paresthesias. All the signs are temporary and usually end in recovery in a few days.~~

Treatment of Those Injured by Irritant WG

Treatment consists of the inhalation of a smoke-control mixture of the following composition: ethyl ether, 20 cc, chloroform and ethyl alcohol, 40 cc each, and ammonium hydroxide, five drops. If there is headache, pyramidon and analgin /aminopyrine/ are prescribed. In exceptionally severe cases morphine is given subcutaneously.

Tear Gases of the Chloroacetophenone Type

These are the so-called police gases, used abroad for breaking up demonstrations; they create a quickly initiated but brief picture of involvement of the eyes. If the toxic smoke enters the eyes the person feels smarting in the eyes, which involuntarily are closed tight shut; as a result of this, temporary blindness occurs, tears flow "in a stream" and liquid excretions from the nose and headache occur. These signs disappear after leaving the focus or even after putting on a gas mask. Inflammation of the

ocular mucosae (conjunctivitis) can occur which disappears in a few days.

Treatment of Those Affected by Tear Gas

The eyes are irrigated with two-percent sodium bicarbonate solution or water. For the purpose of relieving headache pyramiden or analgin is given. When indicated, outpatient treatment is given by an ophthalmologist.

Incendiary Agents

Phosphorus

Incendiary agents used in combat can cause burns by coming in contact with the human skin or clothing. In this connection, white (or yellow) phosphorus is most dangerous, because, aside from the local burn, it can produce general intoxication by absorption; the same applies to napalm.

With oxidation by oxygen of the air, phosphorus smokes, ignites spontaneously and burns with a white smoke, developing temperatures up to 1000°. It is insoluble in water but is readily soluble in fats and organic solvents.

Clinical Picture of Injury

On the skin phosphorus produces deep thermal burns, on the surface of which a smeary dirty-brown mass forms which gives off a characteristic odor, resembling that of garlic. This mass smokes slightly and is luminescent in the dark.

Phosphorus burns are often complicated by the superimposition of infection. Healing of the affected areas occurs slowly. Not uncommonly, this sluggish process drags out for two or three months.

As a result of absorption of phosphorus and its oxidation products general intoxication can occur: at the end of the first day complaints of headache, dizziness, nausea, vomiting, and pains in the hepatic area are noted. Shortly after, jaundice occurs. In the case of severe intoxication the signs develop quickly. There may be pneumonia and pulmonary edema.

Treatment of Phosphorus Injuries

The first problem is that of extinguishing the long-burning phosphorus, for which it is necessary to keep the affected area away from contact with oxygen of the air. This is achieved by immersing the burned part of the body in warm water and by the removal of the phosphorus mass with a forceps under water. If it is impossible to do this, the phosphorus should be extinguished by means of the application of antiphosphorus paste or of a moist

five-percent CuSO_4 solution dressing which is repeatedly irrigated. After the smoking and luminescence have completely stopped the remnants of phosphorus are removed, and the same wet dressing is reapplied. A 0.1 percent potassium permanganate solution may be used in place of the copper sulfate solution. Subsequently, ordinary methods of burn therapy are used with consideration of the severity of the lesion.

By way of controlling the absorptive effect of phosphorus the injection of glucose, sodium hyposulfite, copious drinking of alkalis are recommended; in the case of hemoconcentration bleeding, administration of serum or plasma are recommended. Whole blood transfusion is contraindicated. Cardiovascular drugs should be used as indicated. Vitamins C, B1 and B2 are recommended.

Napalm

Aside from phosphorus, the incendiary group includes napalm, which develops a temperature of $800-1000^\circ$ on burning.

In giving aid it should be taken into consideration that it cannot be extinguished with water. The burning part of the body should be covered with canvas, a blanket, etc. It should be kept in mind that after napalm is extinguished traces of it remain on the clothes and body with an admixture of spontaneously igniting phosphorus particles, which can cause a new flare-up. In rendering medical aid to a person injured by napalm, according to the reports of subsequent flare-ups, the same measures should be taken as for a phosphorus burn. Further medical aid consists of ordinary burn therapy, with consideration of the severity of the lesion.

Wounds Contaminated by War Gases

The following signs can assist in the detection of combined injury:

1. Drops of a yellow-brown color may be found around the wound after the use of a liquid WG which indicate the presence of mustard gas or lewisite.

2. The wound has a specific odor: in the case of mustard gas intoxication it resembles the odor of horse radish or mustard somewhat; in the case of lewisite, a strong geranium odor. When phosphorus is present in the wound there is a characteristic odor resembling that of garlic.

3. When lewisite comes into contact with a wound surface severe pain is noted in the wound.

4. When organic phosphorus WG come into contact with the wound rhythmic contractions of the muscle tissue of the fibrillation type are observed around the wound.

5. When the wound is contaminated with lewisite increased bleeding of the wound surface is characteristic.

6. In the case of lewisite injury the wound surface has a pepper-gray color like a stroke of silver nitrate; in the case of

mustard gas injury there is a dark red color with hyperemia of the surrounding tissue. In the case of phosphorus injury the wound surface smokes and is luminescent in the dark (it phosphoresces); the skin around the wound is burned.

7. The presence of mustard gas, lewisite or organic phosphorus WG in the wound exudate or in excised contaminated tissues can be determined by means of chemical testing with appropriate reagents.

8. The presence of absorption after a considerable quantity of mustard gas enters the body through a wound surface is expressed by a fall in the blood pressure and the occurrence of convulsions. Death is possible. After a considerable quantity of lewisite enters a wound, shock, pulmonary edema, cyanosis and respiratory arrest occur. In the event of penetration of organic phosphorus WG through a wound surface salivation, bronchospasm, loss of consciousness and convulsions are observed. In the absence of immediate medical aid death occurs quickly. With absorption of large quantities of phosphorus through the wound surface and in the absence of appropriate measures a serious picture of its absorptive effect can also develop: convulsions, paralysis, and coma with death after one or two days.

Characteristics of Medical First Aid for Injuries with Various Types of

Injury from Organic Phosphorus WG

For practical purposes of sorting and rendering aid to the injured it is advisable to divide them into three groups: those with mild, moderate and severe injuries.

In those slightly injured from low organic phosphorus WG concentrations in the zone of attack with vapor or from the inhalation of the WG during the time of putting on a gas mask as well as from taking the mask off too early, the main signs are pupillary constriction, headache, restlessness, a feeling of pressure in the chest, quickening of respiration, slight bronchospasm and increased salivation. These signs remain for one or two days.

In the case of moderate injuries distinct signs of bronchospasm are noted (retrosternal pain, asphyxia, signs of hypoxia), with salivation, twitching and spasms of various muscle groups, anxiety, unmotivated behavior and excitation. This injury persists for 5-10 days.

Severe organic phosphorus WG injuries are characterized by paroxysmal convulsions with loss of consciousness, which last 3-10 minutes. The pauses between the convulsions may be 10-20 minutes or more. At this time the injured person is in a state of prostration. There is a disorder of respiration (during the period of convulsions up to the point of respiratory arrest) and a circulatory disorder. The following are marked: increased salivation, filling of the respiratory tree with mucus, increased peristalsis and intestinal spasm, a liquid stool, involuntary defecation and urination,

pupillary constriction to pinhead size; very severe headache. Then "deprivation of movement"--paralysis occurs. In this form of injury death can occur with signs of paralysis of the vital centers--the respiratory and vasomotor centers. In cases which end in recovery the condition lasts 40 days or more.

In the particularly severe cases--after inhalation of high concentrations of organic phosphorus WG--active convulsions and marked bronchospasm with simultaneous, rapidly occurring drop in blood pressure are responsible for the fatal outcome in several minutes.

Medical aid, rendered by medical teams under the supervision and control of civil defense nurses directly in the zone of attack, is begun with stopping further action of the poison, which is accomplished by putting on a gas mask and partial medical processing of areas of clothing and skin with traces of liquid organic phosphorus WG by means of the regulation degasifier of the individual gas casualty first aid kit or from the bag of antichemical agents.

Prompt manual or vehicular evacuation from the focus to the provisional collecting post or directly to the OPM by motor transport is one of the fundamental measures.

Antidote therapy is also given as an urgent matter. The slightly injured are given special antidote tablets or atropine tablets sublingually. In the case of moderate and severe injuries atropine or a special antidote is given subcutaneously by means of a tube syringe with compulsory indication of the fact that the antidote has been given by means of attaching the used tube syringe to the patient's left sleeve.

Before removing the contaminated clothing the gas mask should not be taken off.

If patients are kept at the provisional collecting post for the injured (VFSP) (in case the OPM has not been set up yet and there is no hospital in the vicinity (outside the focus) to which the injured can be sent) the following should be done:

- 1) if it is found that the convulsions are continuing in one injured by an organic phosphorus WG despite the sign of the previously administered antidote the special antidote or atropine should be given again; 2) symptomatic therapy is given (only according to indications): the injection of cardiac stimulants, also by means of tube syringes, namely, camphor oil, caffeine sodium benzoate, 20 percent, etc.; for marked excitation, 0.1 gram of luminal by mouth; for bronchospasm, 0.05 gram of ephedrin by mouth; 3) partial sanitary processing with the special degasifier from the PKhS /antichemical bag/, if it has not yet been accomplished; 4) if the appropriate apparatus is available at the VFSP, oxygen therapy and mechanical artificial respiration, because artificial respiration by manual methods is not effective in the presence of bronchospasm.

Cyanide Intoxication

In mild cases the patients state that they smelled bitter almonds and had a bitter taste in the mouth, complain of dizziness and headache, squeezing in the cardiac region and nausea. The skin and visible mucosae are somewhat pink; the gait becomes unsteady.

In these cases (when the gas mask is put on or changed) an ampoule is put under it for inhalation of amyl nitrite. The top of the ampoule is first crushed. The patients are sent to the VPSP and from there to the OPM, by motor transport as much as possible.

Severe intoxications are characterized by loss of consciousness, convulsions, irregular respiration and subsequently respiratory arrest. The pupils may be dilated.

If such a condition is present, prompt manual evacuation on litters or vehicular evacuation by motorized transport from the contaminated zone is necessary after putting on a gas mask and placing ampoules of amyl nitrite under it. At the VPSP, according to indications, cytitone is injected subcutaneously or intravenously for stimulation of the respiratory center, and artificial respiration is given by hand-operated apparatuses (for a description of artificial respiration apparatuses see the corresponding section in this chapter); if they are not available, manual methods are used—those of Silvester (Fig. 129) or Kallistov (Fig. 130). Cardiovascular agents are used according to the indications. Chromosome (the special antidote) is given intravenously but only at the OPM. The patient is sent to the OPM by motorized transport as an emergency.

Mustard Gas Injury

The existence of a latent period, which lasts for hours, should be taken into account. The majority of persons in the focus of mustard gas attack who have no protective facilities spontaneously leave the contaminated zone before the active sanitation units come, after detecting that a WG has been used or after learning about it, and they are sent to the nearest medical installations even before the appearance of signs of injury.

All those coming from the focus of attack and all those remaining without protective facilities should be given immediate partial sanitary processing for the exposed parts of the body and parts of the skin and clothing with traces of WG by means of the standard degasifier of the PkhS bag, according to the instructions appended, and should be sent to the fixed washing facilities station for complete sanitary processing, even if they do not yet have definite signs of injury. Those in whom the initial signs of mustard gas injury have already come out (nausea, muscle weakness, hoarseness, dry cough, feeling of "sand" in the eyes or only itching and reddening of the skin at places of contact with liquid WG or at mustard-gas-sensitive places after the use of the vapor) should be sent, after partial medical processing with the standard degasifier, to the ODO (bath and degassing unit) of the OPM by motorized

transport and in the sitting position.

In the same way but in the lying position, various particularly severely injured persons are sent to the OPM when they have marked general signs (marked muscle weakness, dizziness, cardiovascular signs). These injured persons are brought out on litters and sent to the OPM lying down in motorized transport.

In cases of combined injuries (with a wound or burn) in the focus a dry sterile dressing is applied to the wound, without removing the clothing in the contaminated zone; this is in addition to partial medical processing of the area around the wound (or burn). In the event of cardiac failure cardiac drugs are injected subcutaneously through the clothing by means of a tube syringe.

Lewisite Injury

The signs of injury develop quickly, which facilitates the diagnosis of the injury.

In mild cases the injury may be limited to irritation of the upper respiratory tract and ocular mucosae as well as reddening of the exposed skin (erythema) from the action of lewisite vapor. These areas should be processed with the special degasifier. A gas mask is put on the injured person; an ampoule containing antilewisite fluid, which has first been crushed, is put under the mask. The injured persons are sent to the VPSP, where, if areas of erythema are present on the skin, these areas are smeared with tincture of iodine. Then, the injured persons are sent to the SOP /fixed washing facilities station/ or OPM.

The gas mask is not taken off until the contaminated clothing has been removed.

In those severely injured with lewisite (after being in a high concentration area, particularly for a long time, or after WG droplets fall on the skin) a severely painful bright erythema of the skin occurs accompanied by edema. In the next few hours vesicles develop which sometimes contain turbid fluid. Reddening edema and spasm of the ocular mucosae, painful irritation of the upper respiratory tract, a troublesome cough and vomiting occur quickly.

In the focus of attack the same measures should be taken as in the mild cases of injury: partial medical processing, putting on a gas mask and sending the patient on a litter to the VPSP or by motorized transport to the OPM.

At the VPSP 5 cc of five-percent unithiol is injected subcutaneously or intramuscularly. According to the indications ordinary cardiac agents are given; if there is a respiratory disorder, cytitone is given subcutaneously.

Injury with Asphyxiant WG (Phosgene, Diposgene)

Directly in the focus of attack the early signs of injury (odor of rotten fruit or mold, nausea, asphyxia, and dyspnea) are

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Antispasmodics are given--ephedrin in a dose of 0.05 gram by mouth or 1 cc of five-percent solution subcutaneously. For severe convulsions evipan is prescribed (only under the guidance of a physician) in an enema--25 cc of the two-percent solution--or intravenously in a dose of 5 cc of the 10-percent solution, given very slowly; excitation is controlled by the administration of luminal in a dose of 0.1 gram or the intramuscular injection of 5 cc of 25-percent magnesium sulfate. For miosis two drops of one-percent atropine solution are instilled into the eye. In case the poisoning occurred from food antidote, therapy must be given promptly, without awaiting signs of injury.

Cyanide Intoxication

For loss of consciousness and convulsions 50 cc of chromosmons are injected intravenously; 50 cc of 30-percent sodium hyposulfite are injected into the vein of the other arm. For respiratory disorder or arrest mechanical or manual artificial respiration and cytitone injection (one ampoule intravenously) are used. With signs of cardiac failure cardiac agents are given, particularly adrenalin in a dose of 1 cc of the 0.1-percent solution subcutaneously or 0.5 cc intravenously. If cyanosis occurs oxygen is used.

Carbon Monoxide Intoxication

Oxygen therapy or carbogen is used as indicated. Artificial respiration is given, and one cc of cytitone is injected intravenously; for excitation, magnesium sulfate 25 percent in a dose of 10 cc is given intramuscularly with cardiac agents; 10 cc of 40-percent glucose solution is given intravenously.

Intoxication from Asphyxiant WG

In the blue form of hypoxia (cyanosis, dyspnea, asphyxia, temperature of 37.5-38°, slow pulse, later fast; cough with foamy sputum), bleeding (300-700 cc), oxygen, intravenous injection of 10 cc of 10-percent calcium gluconate solution and up to 50 cc of 40-percent glucose intravenously are used. Cardiac agents are used as indicated.

In the gray form of hypoxia, the signs of which are a hollow-cheeked or puffed-up deathly pale face, cyanosis of the lips and nails, cold body, marked muscle weakness, excitation, and usually sleepiness, cardiac failure, disorder of the respiratory rhythm, bleeding is contraindicated. Inhalation of carbogen (five minutes) and then of oxygen, intravenous injection of 50 cc of 40-percent glucose solution (slowly, heated to 37°), injection of cardiac agents--coramine, strophanthin, or convallen glycoside from *Convallaria majalis*--are necessary. In the case of a disorder of the respiratory rhythm or respiratory arrest the intravenous injection of 1 cc of cytitone or 0.3 cc of one-percent lobeline solution is indicated.

Mustard Gas Injury

For pronounced skin signs one-percent chloramine wet dressings with one-percent chloramine solution are used; in the winter, two-percent chloramine ointment is applied; dimedrol benadryl, 0.05 gram by mouth, and menthol inunction are used for itching.

In the case of eye involvement they are irrigated with sodium bicarbonate or physiological saline solution; one or two drops of 0.25 percent tetracain solution are instilled, and synthomycin the racemic form of chloramphenicol ointment is applied.

In the case of injury to respiratory organs (hoarseness, cough) the mouth, nose and pharynx are irrigated with two-percent sodium bicarbonate solution; codeine and dionin ethylmorphine are given.

In the event of intoxication by mouth the stomach is carefully washed out with 0.05-percent aqueous potassium permanganate solution, or carbolen is given with subsequent symptomatic therapy in the field hospital unit.

In the presence of pronounced signs of a general absorptive effect early blood transfusion (400-500 cc), intravenous infusion of 30 percent aqueous sodium hyposulfite solution in a quantity of 75 cc, and, after one, three and five hours, in a dose of 25 cc are given.

Symptomatic cardiovascular agents (adrenalin, caffeine, etc.) and respiratory center stimulants (cytitone, etc.) are used.

Lewisite Injury

For irritation of the upper respiratory tract the antismoke mixture is inhaled (the antismoke mixture: chloroform and ethyl alcohol, 20 cc each; ethyl ether, 40 cc; ammonium hydroxide, five drops); for incipient pulmonary edema the intravenous injection of 10 cc of 10-percent calcium gluconate solution or calcium chloride solution or 20 cc of 40-percent glucose solution are used.

For intoxication by mouth two or three glasses of 0.05 percent potassium permanganate solution are given, and vomiting is induced. Five cc of five-percent unithiol solution are given by mouth.

For ocular injury 30-percent unithiol ointment is introduced into the conjunctival sac; then, the eyes are washed out with two percent sodium bicarbonate solution.

Antidote therapy--subcutaneous injection or intramuscular injection of five cc of five-percent unithiol solution.

Symptomatic therapy--cardiovascular drugs (camphor, caffeine); for drop in blood pressure, adrenalin, ephedrine intravenously.

Much of this section of the book is in this abbreviated verbless form7.

With signs of erythema wet one-percent chloramine dressings are used locally; if tense bullae are present they are first punctured, and then their contents are removed.

Characteristics of the Nursing Work in the Specialized Hospitals

Because of the fact that these with MG injuries are sent to

specialized hospitals as soon as complete or partial medical processing has been performed, this measure is not compulsory at the time of admission, with the exception of those cases in which the injured persons enter the specialized hospital directly, bypassing the previous stages of evacuation.

Treatment of those with WG injuries in the hospital is, by and large, of a symptomatic nature, with consideration of the possibility of superimposition of infection, because antidote therapy is effective mainly in the period shortly after injury. Nevertheless, there are elements of antidote treatment in the hospital also. Thus, in cases of injury with organic phosphorus WG atropine may be used, in various cases, for one or two days repeatedly, until signs of injury disappear or until signs of overatropinization appear (dryness in the mouth, reddening of the face, dilatation of the pupils, palpitation). Those injured by lewisite are given a course of treatment with unithiol: 5 cc of the five-percent solution on the first day, three or four times a day; twice on the second day, and once a day for the next five days.

At the orders of the attending physician the nurses should give oxygen or carbogen therapy, be able to use manual and mechanical artificial respiration, perform bleeding with subsequent blood transfusion, give intravenous and subcutaneous injections of drugs, change the dressings on those injured by vesicant WG, those with injuries and burns, combined wounds and WG injuries, and should also give nursing care to the injured and watch their diets, giving them maximum rest and warmth.

Organization and Tactics of the Civil Defense Medical Service

The civil defense system has been created for protection of the population against agents of mass destruction, for rendering aid to the population involved and elimination of foci of destruction which occur in the Soviet Union. It is made up of a number of services the aim of which is taking various kinds of measures under conditions of an air attack. Among these services are: emergency-rescue, fire-fighting, safeguard of the public order and safety, medical, transportation, trade, nutrition, communication and information, medical processing of people and decontamination of clothing and footwear, sanitary processing and decontamination of territory, and others.

The number of different services mentioned is evidence to the effect that prevention and elimination of the consequences of an air attack under current conditions represent a complex matter, requiring tremendous efforts on the part of various mass active units taken from the population: posts, detachments, groups, teams and other active units, the composition of which must be determined beforehand and which must be equipped with everything necessary for carrying out the tasks with which they are confronted.

All the active units mentioned above of the various services included in the civil defense system are created on the basis of institutions existing during peace time. Thus, for example, the fire-fighting service is created on the basis of fire-fighting institutions; the medical service, on the basis of the operative public health institutions; the trade and nutrition service, on the basis of stores, food warehouses, public dining room enterprises (wholesale kitchens and restaurants, restaurants, dining rooms, cafes, tea-houses and others).

Among all the services included in the civil defense system a special place is occupied by the medical service, both with regard to the mass nature of its active units and the problems confronting it. This service is one of the most important in the civil defense system. It is called on to assure the rendering of full-scale medical aid under wartime conditions to all injured persons of the civilian population and to take a combination of measures for the prevention of mass infectious diseases among the population under conditions in which there is a threat of employment of bacteriological weapons.

The importance of the medical service in the civil defense system has increased immeasurably in connection with the danger of utilization of atomic and thermonuclear weapons and other weapons of mass destruction. It is sufficient to say that during the First World War the civilian population casualties from the enemy's destructive agents were negligible by comparison with the casualties at the fronts. In the Second World War, in connection with the development of aviation and pilotless missiles as well as the inhuman manner of waging war by Fascist Germany, the civilian population casualties increased considerably, but they still amounted to an insignificant part of the casualties at the front. It is a characteristic fact that even

with mass enemy air attacks against cities the number of casualties among the civilian population was relatively low. Thus, for example, in the period 1941-1945 the number of civilian population casualties in England from German-Fascist air force and pilotless missile attacks amounted to 43,667 killed and 50,387 severely wounded. Thereby, 190,000 bombs of different calibers were dropped. Therefore, for every bomb there was less than one victim, and after each air attack a total of 40-60 to 100-150 victims occurred. It was not necessary to bring in a considerable number of active medical units and personnel or aid from other cities for the purpose of giving aid to the population involved. As a rule, the medical workers of the given city were able to cope with eliminating the consequences of the air attack by themselves, without help from other cities. Therefore, in the Second World War the medical service of the MPVO (local air raid defense) had few members and only a small number of active units, which included mainly medium-level medical personnel and the active medical group. Thus, for example, in the OFM (first aid detachment) in the Second World War there was only one physician, two nurses and an aid man. Hospitalization of the injured was accomplished, as a rule, in the existing therapeutic-prophylactic installations: hospitals, field hospitals and others. Only in occasional instances were the so-called MPVO hospitals set up in various kinds of public buildings.

The situation changed abruptly when the first atom bombs were dropped on the Japanese cities of Hiroshima and Nagasaki by American airplanes. Tens of thousands of civilians were killed and wounded in these cities in several minutes as the result of the effect of all three injurious factors of atomic weapons--the explosive wave, radiation and light radiation. The medical services of these cities were not prepared for giving medical aid under such conditions; they could not cope with this difficult and complicated problem without aid from the outside. For the purpose of eliminating the medical consequences of the atomic bomb attack on the cities of Hiroshima and Nagasaki the efforts of many medical workers and of the populations of other cities were required. The experience gained in giving medical aid to the civilian population in these cities showed the need for creating a large and mobile medical service, like the other services in the civil defense system.

The Role and Significance of the Medical Service in the Civil Defense System

The medical service is one of the most important in the civil defense system. Its main task is the organization and realization of the combination of therapeutic-prophylactic and sanitary-epidemic measures which have the following aims: giving qualified medical aid to the population in the event the enemy uses weapons of mass destruction; reduction of the mortality rate and of invalidism and the quickest possible return of those affected to socially useful work; the prevention of mass infectious diseases among the population as the result of employment of bacteriological

logical weapons as well as an untoward sanitary-hygienic situation in an atomic focus of destruction (destruction of the water supply and sewage systems, contamination of food products, and others).

Based on the tasks with which it is confronted, the medical service requires extensive coordination with all other civil defense services; without this it cannot exercise its main functions.

Before rendering aid to those affected in an atomic focus of destruction it is necessary to take a number of measures, without which the work of active medical units would be inconceivable.

Among these measures is radiation reconnaissance with the aim of determining the degree of radioactive contamination of a locality. Then it is essential to put out fires, clear ruins and create approach routes to the ruined industrial and municipal installations and houses.

Only after taking these measures can the personnel of the active medical units set about seeking out and manual evacuation of the victims and giving them first aid. This does not mean that the active medical units cannot operate simultaneously with the emergency-rescue groups. Everything depends on the situation which has been created in every specific case.

Basic Principles of the Civil Defense Medical Service Organization

The basic principle of the modern medical service of the civil defense (GO) is its organization on the basis of public health institutions existing in peacetime as well as its mass nature and extensive use of the population.

The second, no less important principle is its maneuverability and mobility, the ability to concentrate the maximum number of personnel and facilities in the region of the focus of destruction in a short period of time.

The third principle of the civil defense medical service is a standard system of therapeutic-evacuation care for the population in the face of destruction, based on two stages of medical evacuation. Organization of the GO medical service on the basis of public health institutions existing in peacetime does not mean, however, that these institutions are utilized in the same form, to the same degree and with the same function as in peacetime. The character of their utilization in the GO medical service system is considerably different from that under peacetime conditions. Thus, for example, the following mobile active medical service units are organized at the outpatient-polyclinic institutions (polyclinic, outpatient departments, dispensaries and health stations): those of the OPM--first aid detachments--which have a definite organizational structure and function. They are maneuverable therapeutic-prophylactic installations designed for giving medical aid to patients directly in a focus of destruction.

The fixed therapeutic institutions--hospitals--are also given a different function in the GO medical service system. Specialized mobile medical active units are formed at them as follows: groups

and brigades of specialized medical aid as well as the specialized GO medical service hospitals (burn, traumatological and other categories).

Various active units of the Red Cross and Red Crescent are included in or added to the medical active units for the purpose of giving medical aid to the civilian population in the case of employment of agents of mass destruction: aid-men teams and medical units as well as organized population groups trained in rendering first aid and transporting patients.

The existence of special mobile active units in the GO medical service system makes it possible to assure the necessary maneuverability of these personnel and facilities in accordance with the situation which has been created, that is, to concentrate them in a focus of destruction, near it, or at another essential point.

The standard system of therapeutic-evacuation care of the population in foci of destruction used by the GO medical service makes it possible to assure correctness in the rendering of medical aid in a focus of destruction and on the routes of evacuation and to organize the evacuation of the injured as indicated.

The GO medical service is constructed on the administrative-territorial principle: oblast (krai), city and rayon.

At the head of the medical services in the union and autonomous republics, krais, oblasts and rayons are the chiefs of the corresponding medical services.

In accordance with the main problems the medical service personnel organizes and carries out:

a) A search for victims in the focus of destruction and gives them medical first aid on the spot, that is, where they are found or near it. These measures are taken by the personnel of the aid-men teams (SD) under the direction of nurses of the searching and sorting parties (PSO). If these active units (SD and PSO) have not been created or prior to their arrival the population and medical workers of intact medical installations of the given object (or city) or of those which have arrived from other inhabited places conduct the search for victims in the focus of destruction and give them first aid.

b) Leads and manually evacuates victims from the focus of destruction to the safest places, the provisional collecting points for the injured (VPSP), where they are not threatened by falling buildings or fires. These measures are taken by the personnel of aid-men teams (SD), by specially designated litter-bearer units, and by organized population groups. For this purpose those who have been slightly injured are also used.

From the provisional collecting point for the injured (VPSP) the injured are sent to the nearest aid stations (or medical installations) with consideration of the degree and nature of their injuries, where they can be given first aid by a physician.

The following may be such aid stations: special medical service active units--OPM (first aid detachment)--sent to the focus of destruction; therapeutic-prephylactic installations: polyclinics, hospitals, medical units, dispensaries, health stations and other public health

institutions, which have been left partly intact in the focus of destruction (zone of moderate destruction).

c) Renders first aid by a physician in the immediate vicinity of the focus of destruction.

This type of aid is rendered by special active units of the medical service--the OPM or the partly preserved public health installations in the focus of destruction.

The volume and nature of first aid by a physician and setting up of the OPM depend on the focus of destruction (atomic, chemical, bacteriological) as well as on the number of persons affected and the presence of personnel and facilities.

One of the most important divisions of medical service work is medical sorting of the injured on the routes of evacuation, that is, from the focus of destruction to the end point of evacuation of the injured person.

Why is this branch of the work one of the most important in medical service activity?

With the use of modern weapons--atomic and thermonuclear as well as chemical and bacteriological--in a very short time a considerable number of the civilian population (tens and hundreds of thousands) may be put out of commission (injured).

In such a very severe and complicated situation it is extremely important to organize medical sorting, that is, to determine which of the group of injured persons should be given first aid and first aid by a physician first, to what degree and at what stage.

In addition, it is necessary to decide which persons among the injured do not need first aid by a physician at a given moment, that is, who can get along with first aid (or self-aid) only and do not need to be sent to the active units and installations of the medical service. Thereby, the medical installations will be relieved of the admission of the most active part of the injured persons, that is, those who actually do not need medical aid. This makes it possible for the personnel of the active units and installations of the medical service to concentrate attention on the more severely injured.

Medical sorting is also essential for determining the order of evacuation of the injured according to indications, depending on the severity and nature of the injury, as well as determining the persons (injured) who do not need evacuation by virtue of their non-transportability, that is, when transportation of them by any means is absolutely contraindicated.

Evacuation of the injured is, along with giving them medical aid, the most important measure, on which the timely rendering of specialized medical aid to the extent necessary and, therefore, the course of the sickness and outcome of treatment depend.

All injured persons who are transportable and who need specialized medical care under conditions of a fixed medical installation [hospital] are subject to evacuation.

Evacuation of the injured persons from the focus of destruction is conducted to the nearest therapeutic-prophylactic installations with the utilization of the most convenient routes of communication and transport.

facilities. For this purpose railroad and water communication routes as well as motorized and air transport are used.

For the purpose of transporting the injured both special (ambulance) transport--trucks, airplanes and trains--and (mainly) adapted transport are used. Ordinary trucks and buses can be quickly reequipped. For these purposes both special, previously prepared adaptations, such as shock absorbers, litters and others, as well as the simplest measures, such as hay, straw, mattresses, etc. are used.

Depending on the degree to which a truck has been adapted, eight to 10 persons, including from three to six litter patients (lying), can be evacuated.

Motorized transport is used for bringing the injured to the nearest specialized therapeutic installations (up to 100-150 km). With the need for evacuating the injured greater distances (over 300 km) railroad transport, sea and river shipping and aircraft are used.

For the purpose of accompanying the injured on the travel route medical accompaniment (MBS) brigades are designated, the aim of which is to render medical aid on the travel route. As a rule, they are made up from the group of medium-level medical personnel (nurses or feldshers) with assignment of aid-men (litter-bearer) units to them. The MBS personnel is equipped with bandaging facilities, drugs for maintaining cardiac activity, analgesics, antibiotics, oxygen inhalers and others.

~~For the purpose of loading and unloading the injured the presence of well trained medical team personnel or the personnel of separate litter-bearer units or experienced medium-level medical personnel is required.~~

The MBS should also provide the necessary care and feeding of the injured on the travel route.

The main principles of evacuation of the involved population under conditions where weapons of mass destruction have been used are the following:

a) evacuation of the injured person from the place of injury to a partly preserved medical installation or OPM, where he may be given first aid by a physician.

b) sending the injured person from the OPM or other medical installation to specialized hospitals, where he can be given specialized medical aid in full volume.

Evacuation of the injured as indicated, that is, bringing the injured persons from the first stage of evacuation directly to specialized medical installations (hospitals). For example, those with bone and soft tissue injuries should be brought directly to traumatological hospitals; those with spinal column and skull injury, to neurosurgical hospitals; those with burns, to burn hospitals, and others.

A tremendous role in the rendering of medical aid to the injured, sorting and evacuation of them is played by medium-level medical workers, chiefly by nurses. The presence of a large number of injured persons after the use of weapons of mass destruction requires the use of a tremendous number of medical workers.

This is why the part played by medium-level medical workers and of special training of them increases immeasurably.

Types of Medical Aid

When weapons of mass destruction are used the medical aid rendered is divided into the following types: first aid, first aid by a physician, and specialized medical aid. In addition, self- and mutual-aid directly in the focus belong to the first aid category.

First Aid--is aid rendered to the injured in the focus of attack by aid-men teams or other specially trained persons under the supervision of nurses of the searching and sorting parties (PSG) and other medium-level medical workers.

First aid consists of the application of an aseptic dressing to an injured surface of the body, stopping of bleeding, immobilization of extremities for fracture by special splints or handy measures (boards, canes, and others), and giving artificial respiration. For the purpose of rendering first aid the aid-men teams have the necessary bandaging material, a tourniquet for stopping bleeding, triangle bandages and other equipment.

First Aid by a Physician is given by physicians of the OPM or of partially preserved therapeutic installations. The volume and nature of first aid by a physician is determined by the circumstances: the number of persons injured, the number of physicians and their technical equipment and other factors.

In the majority of cases first aid by a physician consists of administering antibiotics, tetanus antiserum, and analgesics; taking countershock measures, giving blood and blood-substitutes; ligating blood vessels, eliminating or preventing asphyxia and other measures.

In view of the mass influx of patients, debridement of wounds will not be performed at the OPM, with the exception of cases where it is a matter of life or death, but rather will be postponed to the next stage, where there will be an opportunity for this.

Specialized Medical Aid. This is aid rendered to the injured by qualified specialists--traumatologists, neurosurgeons, otolaryngologists, ophthalmologists, and others.

This type of aid is organized and rendered, as a rule, far from the focus of destruction--at fixed installations of the GO medical service, the specialized hospitals: burn, traumatological, neurosurgical, etc.

The group of specialized hospitals constitutes the so-called collecting hospital. In these hospitals specialized medical aid is given to the injured in full volume, beginning with debridement of wounds and bringing the injured out of shock and ending with very complicated operations.

For the purpose of rendering specialized medical aid to the injured in the specialized hospitals physicians of local medical installations and specialists from other cities and inhabited places in the form of brigades and specialized medical aid groups are used.

In the rendering of medical aid to the injured and sick in the

specialized hospitals a great part is played by the medium-level medical personnel, along with the specialized physicians, particularly by the nurses, who must organize appropriate care for the patients and carefully carry out the physician's orders.

The outcome of treatment and timely return of the injured to work will depend to a considerable degree on the manner in which care and service are rendered to the patients.

Therefore, in the training of nurses special attention should be paid to problems of care of patients, careful and timely carrying out of the physician's orders.

Activated Units and Fixed Installations of the Civil Defense Medical Service

In connection with the probability of simultaneous injury to a considerable number of people from the civilian population by various types of weapons of mass destruction (atomic, chemical, bacteriological), special installations and newly activated units of the GO medical service are created for utilization along with the public health institutions which exist in peacetime--hospitals, polyclinics, health stations, and others.

All the newly activated units of the GO medical service are divided mainly into two groups:

Mobile, which can be rushed from one place to the next in a short time and provide medical aid to those injured directly in a focus of destruction. Fixed, which, as a rule, are connected with a certain base of supply of technical equipment (rooms, complex equipment, apparatus and items) and are called on to provide specialized aid to the injured and make special examinations.

The mobile activated units are the most manuevrable and massive divisions of the GO medical service. They are organized at medical and other installations as well as at enterprises, sovkhoses and kolkhoses.

The most massive activated units of the medical service are the aid stations and the aid-men teams, which do the main work of searching for and manual evacuation of the injured in the foci of destruction, giving them first aid and transportation (on litters or by means of handy facilities) to the nearest medical installation.

Medical Posts (SP)

Medical posts are organized at installations, enterprises and in kolkhoses, using persons who have had special training in accordance with the "Ready for Medical Defense" program. As a rule, a medical post is organized in every shop, tractor brigades, field camps, etc. At the large enterprises several aid stations are organized simultaneously. The medical post consists of four persons: a chief and three corporamen. It is provided with special equipment according to the approved table of organization and equipment, which provides for the following:

a) individual protective facilities (gas masks, protective clothing, rubber boots and gloves, and individual gas casualty first aid kits); b) means of rendering aid to the sick and injured: a medical bag and three small bags with bandaging material, a set of the simplest drugs, tourniquets for stopping bleeding, one litter, two spare gas masks, and canteens for water; c) nonmedical stock: "bat" lamp or electric lantern, sprinkling pump for performing disinfection, etc.

The operations of the medical posts are, as a rule, limited to the territory of the installation at which they have been organized.

In peacetime the aid stations do considerable work on the observation of the sanitary status of various facilities and the taking of measures directed at sanitation of the environment and the creation of the best conditions at work under the supervision of medical workers of health stations, shop and district physicians, together with their work of rendering first aid to the sick and injured.

The medical posts also give considerable assistance to medical workers in giving prophylactic inoculations, making prophylactic examinations and dispensary care.

During wartime, particularly in the event of a sudden enemy attack, the medical post personnel operates independently. Without waiting for the arrival of the mobile newly activated units of the GO medical service at the installation the SP gives first aid to the injured and brings (or leads) them to the nearest medical aid station or to a safe place. ~~A terminological clarification is required here: the medical posts described here are not aid stations such as we have in our armed forces; they are smaller, as can be seen from the description above, with no physician; the aid station, meditsinskij punkt, mentioned directly above corresponds to our aid station/.~~

Aid-Men Teams (SD)

The aid-men teams [sanitarnaya druzhina] are the main, mass activated GO medical service units--they are called on to give aid to the injured directly in the focus of destruction, regardless of the place of its occurrence.

Aid-men teams are formed by the local Red Cross and Red Crescent organizations according to the territorial-factory principle and are made up of the active members of this organization.

With respect to the principle of manning them they are divided as follows:

Into rayon or city teams, organized directly by the rayon (or city) committees of the Red Cross and Red Crescent; installational teams, organized at enterprises and institutions by the primary Red Cross and Red Crescent organizations; transport teams, organized at enterprises and institutions of railroad transportation by the primary organizations of the Red Cross and Red Crescent; rural, organized by the primary organizations of the Red Cross and Red

Crescent in sovkhoses and kolkhoses; school teams, organized in the secondary schools, technical schools and colleges from the student body.

Regardless of the place of its formation the aid-man team consists of 25 persons: a commander, junior political officer, messenger (also chief of the supply section), 20 aid men, of which five are simultaneously unit commanders.

The aid-men team is composed of five aid-men units with four persons in each.

As a rule, simultaneously with the training of the main group of aid men ~~we have called them aid men~~ because of their functions; they are actually women/ a reserve group of 10 persons is trained, calculating two aid-men for each unit.

These aid-men teams are designed basically for operations in the focus of destruction. They have the responsibility of searching for, manual evacuation of the injured from the focus of destruction and giving them first aid.

The work done by the aid-men teams is varied and depends on the nature of the focus of destruction and the situation created. In training aid-men teams this should be taken into consideration. Thus, in an atomic (thermonuclear) focus of destruction the aid-men team (or teams) has the following functions: seeking out the injured; manual evacuation (or leading) of them to a safe place; giving first aid; transportation (on litters or handy facilities) to the nearest medical installation (OPM or other); rendering aid to medical personnel of the OPM (if they are assigned to it) in giving care to the injured; transportation of the injured from one section to another, giving them nursing care, loading the injured into ambulances and railroad cars and others.

In a bacteriological focus of destruction the personnel of the aid-men teams takes the following measures: makes house to house rounds for detecting the sick and contacts; issues memoranda, leaflets and instructions to the population concerning the taking of the simplest disinfection and deratization measures in a bacteriological focus; participates in medical processing of the sick coming into isolation wards, diagnostic departments and infectious-disease hospitals; participates in issuing dry food products to the population; carries out disinfection and deratization in apartment houses, porches, and stairwells, participates in carrying out emergency prophylaxis under the supervision of medical personnel; does work in infectious-disease hospitals, isolation wards and diagnostic departments in the capacity of junior service personnel.

The aid-men teams can also be widely used for work in specialized hospitals.

The aid-men teams are furnished with equipment and special clothing with consideration of their work in various foci of mass destruction.

The following are included in the authorized equipment of the aid-men team: individual protective facilities: gas masks, protective filtering clothing, special cotton suits, boots and rubber

gloves, and individual gas casualty first aid kits; measures for rendering aid and transporting the injured; six medical bags and one with antichemical agents; 17 small bags with bandaging material and drugs; five litters with 10 straps for them; nonmedical equipment: belts and sleeve insignia for each aid man; eight "bat" or electric lanterns, eight whistles, and canteens for water.

The entire work of the aid-men teams, regardless of its nature or volume, should be under the direct control and supervision of medical personnel.

Searching and Sorting Parties (PSG)

The searching and sorting party consists of medium-level medical workers (nurses) only and is included in the OPM as a structural subdivision.

The party consists of 12 persons led by the chief; as a rule, the party is headed by a feldsher, who is deputy chief of the OPM for supervision of mass, newly activated units (SD or others).

The following important tasks are entrusted to the PSG: organization of work of all mass, newly activated units (SD, SP and others) in the focus of destruction, regular supervision of and checking on them; the disposition, expedient utilization and supervision of the unorganized population coming into the focus of destruction for the purpose of giving assistance to the newly activated medical service units in the search for and manual evacuation of the injured persons from the focus and, where necessary, giving them first aid; organization of the search for the injured, manual evacuation of them to a safe place and giving them first aid, using the personnel of the SP and SD and the population; in necessary cases PSG nurses personally render first aid to the injured (in the more complicated cases or if there is a large number of injured persons); provision for preliminary sorting of the injured and all those who do not need further medical care (there may be about 20 percent of such injured persons); organization of coordinated work with newly activated units of other services (emergency-rescue, fire, etc.) and, where necessary, the utilization of them for the search and manual evacuation of the injured from burning buildings, ruins, the upper floors of ruined buildings and others. When necessary, the PSG nurses can and should use the slightly injured for giving first aid to other injured persons, supplying them with bandaging material and other material and establishing suitable control of them; the organization of individual dosimetric monitoring of the entire personnel of newly activated units working directly in the focus of destruction, taking the personnel of the newly activated units out in time to a safe zone and replacing them with others. For this purpose, all the PSG nurses should be equipped with individual dosimeters, by means of which the average dose of radiation in roentgens received by the personnel of the mass, newly activated units (a unit or several units of the aid-men team) working under the direction of a single

PSG nurse is determined; if possible, it is recommended that individual dosimeters be issued to the entire personnel brought into the focus of destruction; organization of replenishment and supply of all the mass, newly activated units working in the focus of destruction under supervision of the PSG with medical equipment.

For this purpose, one of the PSG nurses is appointed "hostess-nurse" and is responsible for putting on record all the property and equipment and timely replenishment of it through the OPM or mobile pharmaceutical supply station, which is brought into the focus of destruction.

In order that the aid-men team members be able to find the PSG nurses quickly and turn to them for aid and advice, the PSG nurses have distinctive marks (red berets or red bands on blue berets).

According to the established table of organization and equipment the searching and sorting parties should have the following equipment: individual protective facilities as follows: gas masks, protective filtering clothing, rubber boots and gloves; facilities for rendering aid to the injured: medical bags with bandaging material and drugs (one for each nurse); bag with first aid equipment for gas casualties (one for the whole group); individual gas casualty first aid kits; outfits and nonmedical equipment as follows: cotton overalls, sleeve bandages and berets for each nurse, canteens for water, "bat" or electric lanterns, and whistles.

The PSG nurses and the medical units (or posts), as well as aid-men teams and the unorganized population used give medical aid as follows: temporary stoppage of bleeding by means of application of a rubber or fabric tourniquet as well as the utilization of "hand-made tourniquets" or other handy means; after the stoppage of bleeding a sterile dressing is applied to the injured surface (wound, burn) (in the case of a burn it is recommended that a special burn dressing be applied); immobilization of extremities for fractures and extensive soft tissue injuries by means of plywood and heavy wire-screen splints as well as handy measures (plywood, boards, canes, and others). If these articles are not available the lower extremities are tied to each other. They take the simplest counter shock measures--rest, precautionary measures in transportation, oral administration of dilute alcohol, vodka, as well as morphine injections, if the PSG nurses have these drugs.

Thereby, various warming procedures are of great importance (hot water bags to the legs, ordinary and chemical, wrapping in blankets, army coat, greatcoat, and others); as is also the rapid manual evacuation of patients from the focus of destruction for the purpose of having them obtain first aid from a physician.

When the injured person is in the region of radioactive contamination, a gas mask, respirator or simple cotton-gauze dressing (with 6-10 layers of gauze and a small layer of cotton between them) is applied to the injured person for the prevention of further entrance of radioactive agents into the body through the respiratory tract.

For the purpose of protecting the PSG and SD personnel against

the entrance of radioactive substances (dust) into the body (through the respiratory organs) and through the exposed surface of the skin it is recommended that the personnel of these newly activated units be brought into the focus in which there is radioactive contamination only in special protective clothing (special protective suits, rubber boots and gloves) and gas masks. As has been pointed out above, the presence of individual dosimeters (one per party or unit) is obligatory. Thereby, the nurses of the PSG and directors of the OPM should keep in mind the permissible doses of external radiation:

Single doses	50 roentgens
Irradiation for one day	10 roentgens
Regular irradiation	1 roentgen per day
Repeated irradiation	No more than 100 roentgens a year

The operations of PSG nurses and the medical units and aid-men teams under their supervision in a focus of chemical attack have their specific features and are different from operations in a focus of atomic destruction, described above.

Under current conditions the chemical focus of destruction is characterized by considerable area involved, high WG concentration, persistence and rapidity of action. In connection with this, the PSG nurses and the aid-men team members under their direction must be prepared for action in a chemical focus and appropriately equipped.

When these newly activated units (PSG and SD) are brought into a chemical focus it is essential, first of all, to know accurately the nature of the WG, which makes it possible to protect the personnel of the newly activated units appropriately as well as to take the necessary preparatory measures (oral administration of different kinds of prophylactic antidotes--antidotes and other substances which neutralize, prevent or lessen the effects of WG on the human body).

PSG nurses and aid-men team members working in a chemical focus should each have one or two spare gas masks (for the patients) and tube syringes containing antidotes.

For the control of asphyxia oxygen therapy and artificial respiration under pressure should be widely used in addition to special measures. For this, the PSG nurses have oxygen inhalers of the light type.

PSG nurses and the aid-men team members under their direction, acting in a chemical focus, take the following measures:

Search for the injured and immediate application of gas masks to them with simultaneous administration of special agents (antidotes) by means of a tube syringe or other method. Rapid manual evacuation of the injured from the focus of attack. In a chemical focus this is of greater importance than in an atomic focus. Rapid manual evacuation of the injured from the chemical focus should be accomplished, because further time spent in the poisoned atmosphere is absolutely contraindicated, because the injured person needs emergency first aid by a physician.

The PSG nurses should give special attention to this measure, that is, to very rapid manual evacuation of the injured from the focus of destruction.

The searching and sorting parties can do other types of work along with their main function, the rendering of medical aid to the injured in the focus and supervision of the mass, newly activated Red Cross and Red Crescent units (SP and SD); accompany the injured to the railroad echelons sent into the suburban area, give care to the sick and injured in the specialized hospitals in the suburban area. However, PSG nurses can be brought in for this work only after they finish their work in the focus.

Taking into consideration the fact that the PSG nurses will be used for giving care to the injured and sick in specialized hospitals, they should be trained for this big and important job beforehand. Thereby, special attention should be paid to their mastering knowledge and good practical habits of organization of nursing care of patients with radiation sickness, burns, injuries and others.

The First Aid Detachment (OPM)

This is the principal mass activated unit of the civil defense medical service. The first aid detachment (OPM) is made up of the following: medical divisions, which are the main component of the OPM. Among them are the following: receiving and sorting, operating and bandaging, and evacuation hospital divisions; the bath and disinfection unit (ODO); the searching and sorting party (PSG); service unit; aid-men teams, which are included in the OPM for work directly in the detachment; laboratory; pharmacy.

The OPM is organized at city and rural public health institutions (hospitals, polyclinics and other therapeutic-prophylactic institutions), which allot the necessary number of physicians and medium-level medical cadres for manning the main (medical) units of the OPM. The other structural subdivisions may be supplied by other institutions and enterprises.

The OPM is equipped with various drug and bandaging materials as well as medical outfits and instruments necessary for rendering first aid by a physician and surgical care for life-or-death indications.

The organization of the search for and manual evacuation (or leading out) of the injured from the focus of attack and rendering of first aid to them are accomplished by the OPM through the mass, war-time activated units included in it and assigned to it (PSG, SD and others).

In connection with this, the OPM is in charge of the work of all the mass activated units operating in the focus of attack on the territory of the OPM activity.

The OPM is entrusted with the following tasks:

Providing for mass medical, sorting of the injured coming into

the OPM. The sorting at the OPM is accomplished by a physician with the aid of medium-level medical personnel (nurses).

Rendering first aid by a physician and surgical care (operations) to the injured in accordance with extreme indications.

The volume and nature of medical aid may be reduced or increased depending on the situation.

The accomplishment of dosimetric monitoring and medical processing of the injured as well as decontamination of their clothes and shoes.

Temporary isolation of the patients with infectious diseases, those suspected of infectious disease as well as persons with various mental disorders.

Medical equipment supply for all mass units operating in the OPM district: drugs, bandaging materials, litter distribution stock, gas masks and others.

Preparation of the injured who can be transported for evacuation as indicated and organization of the loading of them onto special or adapted transport put at the disposal of the OPM.

The organization of medical service and care of the severely injured nontransportable patients who may be at the OPM.

Being a mobile maneuverable unit, the OPM should always be ready to drive out to the focus of attack and set up operations in the focus in the shortest possible time. The lives of many injured persons and the outcomes of their treatment will depend on this.

The second invariable condition for the operation of the OPM is smoothness and precision of operation of all structural subdivisions included in it. It is perfectly obvious that the loss or poor work organization of one of the units (or structural subdivisions) of the OPM will inevitably reflect on its entire operation and can even cause a breakdown of it.

Thus, for example, poor work of PSQ nurses and, particularly, lack of fulfillment of their main requirement--the accomplishment of initial sorting of the injured directly in the focus--can lead to difficulty in the OPM operation.

If, for various reasons, dosimetric instruments and equipment of the ODO go out of order it can bring about serious consequences: in the case of involvement of territory, premises or personnel it will be impossible for the OPM to detect the injured persons who need medical processing.

Of great importance in the work organization of the OPM is the interrelationship and coordination of operations with the active units of other GO services (fire-fighting, emergency-rescue, transport, trade and food, and others). This is essential for insuring the operation of the OPM.

In order correctly to organize the work of this institution and, therefore, to give more and better service to the injured, it is necessary to determine in a clear-cut manner the volume and nature of the medical aid at the OPM, its possibilities for operations in various foci of destruction and in a specific situation.

Based on the possible structure of the destruction by atomic weapons, we can run into the following pathology: a large number of injuries, burns, radiation injuries of different degrees and combined injuries (injury + burn + radiation sickness).

Therefore, in the group of injured persons who will come into the OPM there may be injured persons with various pathological conditions--shock, radiation syndrome, and others.

At the OPM, operating in a focus of atomic destruction, the nature of first aid by physicians rendered will be realized along two main lines:

1) The rendering of emergency surgical aid for life-or-death indications (tracheotomy, emergency amputation of extremities, closure of pneumothorax, etc.). Without prompt surgery the injured persons in this category may die quickly or may fail to be evacuated.

2) The taking of measures directed at assuring a more favorable course of the pathological process, prevention (prophylaxis) of various complications (shock, wound infection) as well as those assuring transportability of the injured.

Based on these main trends, the medical aid at the OPM will contain the following divisions. Measures directed at rendering of emergency surgical aid, namely: tracheotomy in case of asphyxia; emergency amputation of extremities in the case of extensive injury to bone and muscle tissues and rupture of the vascular bundle; laparotomy (incision of abdominal cavity) in the case of intraperitoneal bleeding and injury to internal organs; closure of open pneumothorax in the event of considerable chest injury; surgical measures for some other pathological conditions. Measures directed at prevention of development of severe complications in the injured: injection tetanus antiserum for purposes of preventing wound infection. For the same purpose prophylactic injection (intramuscularly) of various antibiotics is given: penicillin, bicillin and others; the patients or the accompanying medical personnel (in the case of evacuation) are issued antibiotics in the form of tablets to take by mouth: penicillin, tetracycline, terramycin and others.

These measures are extremely important and essential, because at the OPM, as a rule, primary debridement of the wound and burn surfaces will not be carried out.

Among the countershock measures are the following: definitive stoppage of hemorrhage; determination of the proper setting of fractures and application of transportation and immobilization splints (replacement of splints previously applied); injections of morphine or other analgesics; transfusion of preserved blood and blood-substitutes (synthetic, heterogeneous, and saline). This measure is one of the important ones in shock control. Novocain block (regional, vagosympathetic) as well as the intravenous injection of 20-30 mg of 0.5-percent novocain (for shock and severe pain); measures for reduction of intoxication in extensive and severe burns (intravenous injection of blood-substitutes).

Along with these measures the following are also taken (according to the indications): checkup and replacement of dressings

filling out of special medical cards on the injured and feeding them (hot, sweet, strong tea or coffee with open sandwiches). Copious hot fluids are particularly necessary for persons with considerable blood loss, burns and radiation injury.

The work of the various OPM units amounts to the following.

Distributing Post. The distributing post is set up by the receiving and sorting division of the OPM and consists of four persons: a nurse, who is the chief of the RP (distributing post), of two dosimetrists and one aid man.

The RP is set up at a distance of 50-100 meters from the receiving and sorting division of the OPM. The main purpose of it is the following: to determine the degree of contamination of the injured with radioactive substances with the use of the dosimetrists; to separate the litter- and the walking-injured into separate lines; to set apart the patients with infectious and mental diseases.

The entire RP personnel must work in protective clothing (special suits, rubber boots and gloves, and gas masks).

The aid man stands in front and regulates the admission of the injured. First of all, he must admit the litter patients. Then come the dosimetrists with their dosimeters for determination of the radioactive contamination of the injured, their clothing and shoes.

Then, comes the nurse, who, being guided by the results of the dosimetric check, sends the injured persons on as follows: the slightly injured, not contaminated with radioactive agents, to the receiving and sorting division of the OPM; all slightly injured persons contaminated with radioactive agents, to the ODO (bath and deactivation unit); this applies also to those needing medical processing; all the litter injured, without regard for the presence or absence of radioactive agent contamination, are sent to the receiving and sorting unit (for the severely wounded), bypassing the ODO; patients with infectious diseases, to the isolation ward; patients with mental diseases, to the psychiatric isolation ward.

Bath and Degassing Unit (ODO) [Note that the "D" in ODO can stand for deactivation, degassing or disinfection, depending on the situation]. All the slightly injured with radioactive agent contamination, with the exception of the seriously injured litter patients, are sent to the ODO before being admitted to the receiving and sorting division.

The ODO is a structural subdivision of the OPM and is set up 50-75 meters from the medical divisions of the OPM with consideration of the direction of the wind.

The main tasks of the ODO are the following: medical processing of the injured, which should be conducted with consideration of the possibility of combined use of various agents of mass destruction, that is, of atomic and chemical weapons simultaneously, of chemical and bacteriological weapons, etc.; decontamination of the clothing, shoes, litters, gas masks and other articles which have been contaminated with radioactive substances and WG as well as

bacterial agents; the ODO is equipped with a motorized shower apparatus and facilities for disinfection, sanitary-chemical processing, protective clothing for the personnel, a container for the packing of clothing of the injured and other property.

Two areas are equipped for operation of the ODO. On the first, medical processing of the incoming injured persons is accomplished; on the second, decontamination of clothes.

For convenience of operation of the area designed for medical processing of the injured it is divided into three zones. In the first zone the outer and inner clothing and shoes are removed from the injured persons and sent for deactivation (or degassing if the injured persons come from a chemical focus).

Here also the nurse washes out the eyes and nasopharynx with 0.5 percent sodium bicarbonate solution. In the event of considerable contamination of the hair on the head, it is cut off.

In this zone of the area measures are taken for the protection of dressings applied to wounds, against the entrance of water and simultaneously radioactive or H_2 into the wound. With this aim in view, waterproof fabric (oilskin with bands, polyethylene fabric and others) is applied to the area with the dressing, covering it completely.

Only after this preparation is the injured person sent to the second zone of the area.

In the second zone the injured person is given careful medical processing (washing with soap under a warm shower). The hairy surface of the body, ears, eyes and nose passages should be particularly well processed. Ditches and drainage pits are dug for the drainage of the contaminated water.

In the third zone the injured person is given a dosimetric check for the presence of radioactive agents. In the event of a negative report by the dosimeter the injured person puts on his clothes, which should be deactivated prior to this (in the second area).

After this, the injured person is sent to the receiving and sorting division for the walking injured. If, according to the dosimetric readings, the injured person has been washed inadequately or the clothing has been insufficiently deactivated, the medical processing of the injured person and deactivation of the clothing are repeated.

Decontamination (or deactivation) of the clothing and shoes of the injured persons as well as the gas masks, litters and other articles is accomplished in the second ODO area.

Here, the clothing is hung out on lines and beaten with a stick, freeing it of radioactive dust until a dosimetric check determines the possibility of sending it to the first area for the injured persons to wear.

Rubber and leather goods (gas masks, boots, shoes and other articles) are processed by means of a wet rag.

The decontaminated articles are placed in bags (in the clean half of the second area) and sent to the medical processing area.

During the work the ODO personnel should be in gas masks, protective

clothing and rubber boots and gloves, and should change more often.

The following are carried out at the conclusion of the CDO work: deactivation of the area, equipment and clothing of the personnel after work; medical processing of the personnel after all operations have been completed.

The Receiving and Sorting Division. The receiving and sorting division is the medical division of the OPM and is designed basically for receiving and sorting of the injured and for giving them medical aid, injection of tetanus antiserum (a must), narcotics and cardiac agents (when indicated) and others. It is particularly essential for the receiving and sorting division to have a proper and precise work organization; the rapidity and quality of aid to the injured depends on it to a certain degree. The receiving and sorting division should have separate rooms for reception of the walking and litter injured.

The most important function of the receiving and sorting division is the medical sorting of the incoming injured. Sorting is accomplished by a physician, who must decide a number of other extremely important matters: the order of operations on those injured persons who need emergency surgery for life-or-death or other indications (impossibility of further transportation); determination of the group of injured persons who, by virtue of their conditions, cannot be evacuated beyond the OPM in the immediate future (nontransportable); determination of the need for first aid by a physician; replacement of a contaminated dressing; application of transportation or immobilization splints, taking of a whole combination of counter shock measures, and other types of medical aid.

A great part in the rendering of aid to the physician in the accomplishment of medical sorting is played by the nurses, who should carry out the physician's orders and instructions quickly.

In the receiving and sorting division a special medical record card is filled out, which is of importance for the next stage of evacuation.

The nurse (or registrar under her observation) fills out the passport portion of the medical record card; thereby, data on the localization and nature of the injury are underlined with an ordinary pencil. The nature and volume of the therapeutic-prophylactic measures taken should be noted with particular care in the record card: the injection of tetanus antiserum, with indication of the dose and date of the injection; injections of morphine and antibiotics (dosage and time of injection), and other measures.

Along with filling out the medical record card on the injured person, special marking tags are issued on which, by figures, letters or other arbitrary signs (shape, color, etc.), the place to which the injured person should be sent and his turn are indicated.

In accordance with the conclusion and instructions of the physician who does the medical sorting and the marking tag issued, the nurse should arrange and distribute the injured in such a way that the physician's orders are strictly observed. With this aim in view, the nurse divides the injured into first group, second group,

etc. Thereby, the injured persons requiring surgery (headed for the operating room) as well as the injured persons needing medical care in the bandaging room, those who need to be sent to the countershock ward, etc. are put into the first and second groups.

Such an arrangement of the injured makes it possible to give them aid in accordance with the severity and nature of the injury with the observance of turns.

A special room is set apart in the receiving and sorting division for sorting and giving aid to the slightly injured. Here, as is the case with the entire group of injured, they are injected with tetanus antiserum; the medical record and sorting are accomplished; antibiotics and others are given by mouth or injected (subcutaneously, intramuscularly).

Sorting pursues the aim of detecting the injured needing operation or bandaging. The other injured persons, bypassing the operating and bandaging unit, are sent to the evacuation hospital unit or directly to the area designed for the evacuation of the sick and injured.

The Operating and Bandaging Unit. This division is designed for surgical aid to the injured and for taking the basic countershock measures: transfusion of blood and blood-substitutes as well as other types of medical aid (definitive stoppage of bleeding, change of dressings, immobilization of extremities, etc.).

In the operating and bandaging unit, under the conditions of a mass influx of injured persons, the volume and nature of aid must be strictly defined and limited.

In view of the impossibility of rendering surgical aid in full volume to all those needing operation, the latter is performed only for life-or-death indications in some pathological conditions.

By and large, surgical aid amounts to a change of applied dressings, taking countershock measures (stopping bleeding, transfusion of blood and blood-substitutes, immobilization of injured extremities and others) and measures for the prevention of wound infection.

In the work of the operating and bandaging unit the absence of performance of primary surgical debridement of wounds and burn surfaces because of a lack of opportunity to do so is characteristic. For the purpose of preventing wound infection the injured persons should be loaded up with long-acting antibiotics (of the bicillin type, etc.) with particular care.

Considering the large number of injured persons, the entire work should be arranged with consideration of the greatest possible handling capacity. For this purpose, several operating tables are set up in each unit.

In all, the operating and bandaging unit sets up one bandaging room for the slightly injured, one bandaging room for the severely injured and an operating room for surgical operations for life-or-death indications.

Considering the influx of a considerable number of severely injured persons, including those with radiation sickness, burns and combined injuries, the main attention should be directed to the

prevention of severe complications associated with acute and considerable blood loss, the prophylaxis of radiation sickness and wound infection.

All the measures indicated should, for the most part, be taken by medium-level medical personnel under the direction of the physician-surgeon.

Based on this, the OPM nurses, and chiefly those of the operating and bandaging unit, should be well trained practically for the intravenous transfusion of blood and blood group determination, administration of various blood-substitutes, dry plasma and other agents.

The nurses of this unit should also be able to apply dressings to a wound well, treat a burn surface and apply immobilizing splints, and use dosimetric apparatus.

The nurses of this unit should be trained in preparing donor blood by the two-stage method.

Along with the rendering of various types of surgical aid to the injured, evacuation-transportation sorting is carried out in the operating and bandaging unit the purpose of which is the following: determination of the order of evacuation of the injured persons who have passed through the unit; detection of persons (injured) for whom transportation is contraindicated and who, by virtue of this, are to be given further treatment at the OPM.

The Evacuation Hospital Unit. This unit is designed for the temporary housing of the great majority of injured persons and the organization of their evacuation (loading them onto transport).

In addition, the evacuation hospital unit has the responsibility for the distribution and organization of care for the nontransportable injured and for setting up an isolation ward for patients with infectious diseases and a psychiatric isolation ward for those with mental diseases.

Among the nontransportable are the following injured persons: those in a state of severe shock before being brought out of this condition; after operations on abdominal organs; after operations on chest organs, particularly in the presence of extensive pneumothorax; those with fractures of the skull bones with considerable depression of the fragments causing severe excitation of the injured person and other pathological states.

In accordance with the tasks and function of the evacuation hospital unit, its work is along three main lines:

- 1) Organization of medical service and nursing care of nontransportable patients. The unit personnel should provide suitable care for this category of patients and take measures for bringing them of their serious conditions. Considering that this category of seriously ill patients will be in the evacuation hospital unit for a relatively long time, nursing care, feeding, etc. must be provided for them. Here a tremendous part is played by the medium-level medical personnel.

- 2) Organization of medical service to and preparation of the main mass of injured persons coming into the evacuation hospital unit for evacuation. Thereby, special attention should be given to two factors:

bringing the injured persons out of the shock state. For this purpose specially equipped countershock wards are set up in the evacuation hospital unit. Sorting of the injured according to the nature, severity and localization of the injuries, that is, division into groups as follows: neurosurgical, burn, those with injury to the thigh and large joints, those with injury of the chest and abdominal organs (thoracoabdominal), etc.

This grouping of the injured according to the nature and localization of the injury is accomplished with the aim of facilitating evacuation as indicated for the purpose of rendering specialized medical aid.

In a suburban area the GO medical service hospitals are organized according to the category principle, that is, for the reception of burn patients only, traumatological patients only, thoracoabdominal patients only, neurosurgical patients only, internal medical patients only (with signs of radiation sickness), and others.

Therefore, the injured evacuated according to uniform groups can be brought more quickly to the therapeutic installation where they will receive treatment until they recover.

If this principle is not observed in the sorting and loading of the injured, afterwards, in the suburban area, it will be much harder to conduct the medical sorting in the area of the sorting and evacuation hospital for distribution to specialized hospitals.

Undoubtedly, if the necessary uniform group of injured persons has not been made up in the evacuation hospital unit at a certain specific moment, they should be loaded onto the assigned transport regardless. However, it is necessary to strive for evacuation of the injured in uniform groups.

Evacuation to the suburban area should be carried out first for the severely injured (litter patients). The slightly injured should be put in the places which the litter patients vacate, also with consideration of the nature and location of the injury.

In the case of a mass of injured persons, the evacuation, as a rule, will be carried out on trucks adapted for this.

Three to four lying (litter) and five to six slightly injured persons can be placed in one ambulance. If there are special adaptations for litters, it is possible to take six or seven litter patients. No accompanying medical personnel is assigned for transportation on ambulances, because for practical purposes it is not possible to give aid to the injured on the travel route (it would entail the need for stopping the column so that the medical worker be enabled to go from one ambulance to the next, etc.).

No medical equipment is provided for the motorized transport designed for transporting the injured, with the exception of the case in which those affected by WG are evacuated on it. In these cases the ambulance is equipped with oxygen apparatuses: tanks with gas outlet tubes and masks or oxygen inhalers for individual or group use.

Considering that nontransportable injured patients left in

the evacuation hospital unit will encumber the work of the personnel and paralyze the activity of the unit, it is essential to take measures for the transportation of this category of injured persons (the non-transportable) on litters to the nearest intact therapeutic installations (within a radius of five kilometers). The population capable of doing work and other persons should be used for this work.

This measure can facilitate the work of the evacuation hospital unit and create more favorable conditions for the treatment and nursing care of nontransportable patients.

The structure, volume and nature of work of the OPM are evidence to the effect that this mobile active unit is the main one with regard to operations in the focus of attack, and therefore it requires the special attention of public health organs in its manning and training. Well trained personnel should make up the OPM.

The Specialized Medical Aid Group (GSMP)

Among the mobile active units of the medical service is the specialized medical aid group, which is made up from the group of qualified specialists of hospitals, medical and scientific research institutes.

The main task of these groups is that of rendering specialized medical aid to the injured in specialized hospitals in the suburban area. In the event of extreme necessity, because of the situation created, the specialist physicians may render aid to the injured directly in the focus of attack (under conditions of the OPM or intact hospitals). However, such utilization of highly qualified specialists is inefficient, because at the first stage (under OPM conditions) they do not have the opportunity to utilize their knowledge and experience fully.

The specialized medical aid group consists of 14 specialized brigades, in which specialist physicians and medium-level medical personnel are included.

The following brigades are included in the group: sorting, general surgical, traumatological, neurosurgical, thoracoabdominal, burn, ophthalmological, maxillo-facial, otorhinolaryngological, toxic and internal medical, infectious-disease, blood transfusion and radiological.

The brigades are furnished all the necessary equipment, packed in special packing, according to the authorized tables of organization and equipment.

Along with the brigades included in the GSMP, separate brigades of specialist physicians may be organized (according to specialties) in those cases where there are no conditions for organization of the GSMP with all its authorized personnel.

The GSMP and separate brigades are sent into the suburban area by the appropriate medical service chief.

On arrival at the collecting hospital the GSMP is divided into brigades and is used chiefly for work in the specialized

hospitals. Here the specialists of the brigades take measures for instructing all the hospital personnel (physicians and medium-level medical workers) in the rendering of specialized medical aid and in nursing care of the injured and they organize the work of the given installation in their specialties, in addition to rendering practical aid to the injured.

Installations of the Civil Defense Medical Service

Along with the mobile active units in the medical service there are a number of installations which render specialized medical aid to the injured. All these installations are set up in the suburban region--in the so-called sorting evacuation center (SEB), which is the second stage of medical evacuation.

The injured are sent from the first aid detachments, which represent the first stage of medical evacuation, to the installations of the sorting evacuation center, where they are given specialized medical aid and are treated until the final outcome of their conditions.

Thereby, it should be noted that the main mass of the injured arrives at the SEB installations simultaneously in the first two or three days after the focus of destruction has been created. Under conditions of a sudden attack the injured persons may arrive at the time the SEB installations are still being set up.

~~The sorting evacuation center has several collection hospitals, which consist of five or six specialized hospitals.~~

~~The collecting hospital may be located in a single large inhabited place or in several.~~

In its structure each collecting hospital is a multispecialty hospital combination, that is, it takes injured persons with injuries of different categories and natures.

The hospitals included in each collecting hospital are of a single specialty: burn, traumatological, or neurosurgical (for those with injuries of the skull, spinal column, ear, throat, nose, eyes and maxillo-facial area), thoracoabdominal (for those with injuries of the chest, abdomen, pelvic organs, including gynecological and urological injuries), for those with injuries to the thigh and large joints, and internal medical (infectious-disease, including those suffering from acute radiation sickness).

Some specialized hospitals may be wanting in the collecting hospitals because of a lack of physicians in the narrow specialties and for a number of other reasons.

In each collecting hospital a collecting point for the slightly injured (PSLP) is organized for the reception and treatment of the slightly injured.

A directing /kolovnaya/ hospital is provided for each collecting hospital.

The main functions of the directing hospital are: reception of the injured coming into the given collecting hospital, sorting of them and sending them to specialized hospitals; the reception of the most severely injured, who are in a serious shock state and who

cannot, without danger to life, go to one of the specialized hospitals, and the rendering of emergency specialized aid; supervision of the specialized hospitals of its own collecting hospital.

The directing hospital has the following organizational structure:

1) administrative office; 2) receiving and sorting division; 3) emergency aid division; 4) operating and bandaging section; 5) counter-shock division; 6) lying-in division; 7) psychiatric isolation ward; 8) auxiliary medical units: pharmacy, clinical-diagnostic laboratory, station for the preparation and transfusion of blood, a physiotherapy department and a pathology laboratory; 9) auxiliary administrative and nonmedical divisions.

The main functional unit of the directing hospital is the receiving and sorting division, which is composed of the following: a sorting area; receiving; medical examining post; area for deactivation of the clothing and footwear of the injured as well as for deactivation of the ambulance.

The sorting brigade sorts the injured mainly into two sections: those who are to remain at the directing hospital and those who are to be sent to the specialized hospitals. Those remaining are subjected to dosimetric monitoring and are sent to the receiving unit or for medical processing first.

Indications for hospitalization in the directing hospital are a serious condition threatening life and not permitting further evacuation to specialized hospitals, including a severe shock state (~~third-fourth degree shock~~), manifest arterial bleeding and others.

All the other injured persons are grouped according to the category of injury and are sent to the corresponding specialized hospital.

Nurses included in the sorting brigade are used for rendering the necessary aid in the sorting area (reinforcement of dressings, adjustment of transportation splints, injection of drugs as indicated).

In the receiving unit the patients are sorted for the purpose of sending them to the division of the directing hospital indicated. When a large number of persons comes in for medical processing, only those really needing it, because of heavy contamination of skin and clothes, are sent for it.

On the third and fourth days the lines of injured persons from the focus are reduced; the directing hospital discontinues its sorting functions, and it is converted into a single- or double-specialty hospital depending on the main category of incoming injured.

Specialized hospitals included in the collecting hospital are designed for the simultaneous admission of a large number of injured persons.

At all the surgical specialized hospitals provision is made for a large receiving and sorting division with a medical examining post, an operating and bandaging section, a field hospital division, an isolation ward, an anaerobic division with operating and bandaging rooms and auxiliary medical functional units: pharmacy, clinical-

diagnostic laboratory, physiotherapy department, pathology laboratory, blood transfusion department and others.

During the first few days of reception of the injured the greatest load falls on the receiving and sorting division and the operating and bandaging section. For this period of time these divisions are reinforced by medical personnel from the other divisions. The bandaging sections operate, for the most part, like the operating room sections. The operating brigades are organized for 24-hour continuous surgical work.

After the completion of evacuation of the injured from the focus (on the third-fifth day after the focus is created) the receiving and sorting division stops work, and its personnel is divided among the other divisions. The premises of the receiving and sorting division are, in turn, utilized for other purposes.

The organization of feeding of the injured offers greater difficulty in connection with the setting up of the specialized hospitals in adapted quarters. The preparation of hot food is organized at public dining rooms (dining rooms, tea-houses, etc.), sometimes with several shifts of cooking personnel.

Of great importance in the work of specialized hospitals is the prevention of intramural hospital infections. In this connection, it is necessary to make maximum use of the local public, and primarily of the Red Cross and Red Crescent societies, not limiting their work to the unloading of incoming ambulance or railroad (or water) transport, aside from the authorized medical personnel. In arranging the patients in the wards there should be no worry about placement of the injured in the same wards as those who have combined radiation injuries, nor is there any need to set apart special operating and bandaging rooms for these groups, because the preliminary medical processing and deactivation of clothing and footwear eliminate the danger of effect of radioactive substances on persons around.

Along with elements in their organization and manner of doing therapeutic work common to all the specialized hospitals, these hospitals also have considerable differences (the category and characteristics of specialized medical aid, treatment and nursing care of the injured).

Sanitary and Anti-Epidemic Measures in Foci of Mass Destruction

In the general system of GO medical service measures for medical care of the population in the event of employment of agents of mass destruction, sanitary and antiepidemic measures are of special importance.

Considerable destruction to buildings, fires, the disruption of water supply and sewage systems, contamination of the locality with radioactive agents in an atomic focus create a serious sanitary situation and contribute to the occurrence of various epidemic infectious diseases. Sanitary and antiepidemic measures are organized and taken immediately by the sanitary-epidemiological institutions,

and the sanitary-epidemiological stations (republic, oblast, kray and city); in the rural rayons, by the sanitary-epidemiological divisions of the rayon hospitals.

Under conditions of possible employment of agents of mass destruction the sanitary-epidemiological stations are given the responsibilities of: sanitary inspection of the condition of collective protection facilities; increase in sanitary prophylactic inspection of water supply sources, public dining rooms, food enterprises, and places where the population congregates (railroad stations, clearing stations, etc.); organization of prophylactic inoculations; organization of the expertise of WG, radioactive agent and bacterial contamination of water and food products; the taking of measures of training medical personnel for a bacteriological attack; the taking of measures for detection of bacteriological weapons; the organization and taking of measures of antibacteriological protection of the population in cooperation with other GO services when there is an immediate threat of employment of bacterial weapons and in the event of a creation of a bacteriological focus; organization of antiepidemic measures in the event of occurrence of atomic and chemical foci of destruction; the organization and taking of measures for the elimination of a bacteriological focus in cooperation with other GO services under the general supervision of GO units.

All these measures are carried out with the extensive use of laboratory methods of examination, of active sanitation or disinfection measures and of the population.

At the SES (sanitary-epidemiological station), mobile anti-epidemic detachments (PPEO) are organized in the form of attack as mobile active units of the SES. The detachment includes epidemiological, laboratory and disinfection divisions with a total staff of 14 persons.

The PPEO has mobile technical equipment: a motorized laboratory, of which the laboratory equipment can be stowed on an ordinary truck, and a motorized shower apparatus. The organization of hospitalization of patients with infectious diseases in specialized hospitals and the setting up of isolation wards for persons who have been in contact with these sick with particularly dangerous infectious diseases are accomplished by the personnel of the medical system of the public health organs.

In the event of contamination of the locality with radioactive agents or the occurrence of chemical and bacteriological foci, mass medical processing of the population, deactivation, disinfection and degassing of the footwear and clothing of the population are organized by a special GO service, the medical processing and clothing decontamination service, created at the various municipal enterprises. For purposes of medical processing of the population this service utilizes primarily the existing system of municipal bath-houses, shower pavilions and official medical examining posts.

Under civil defense conditions these institutions are given the name of "fixed washing facility stations" (SOP). The medical

[service gives these installations medical personnel (nurses) for washing out the mucous membranes of the mouth and nose, for giving first aid, as well as for sanitary control.

For the depassing and disinfection of clothing the fixed disinfection chambers of these installations are used; for the deactivation of clothing and footwear special areas are organized on neighboring sections of an open locality.

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